THE IRON AGE

New York, November 21, 1929

ESTABLISHED 1855 VOL. 124, No. 21

White Metal Used in Architecture

Modern Edifices Show Extensive Use of White, Corrosion-Resisting Metals for Exterior Decoration

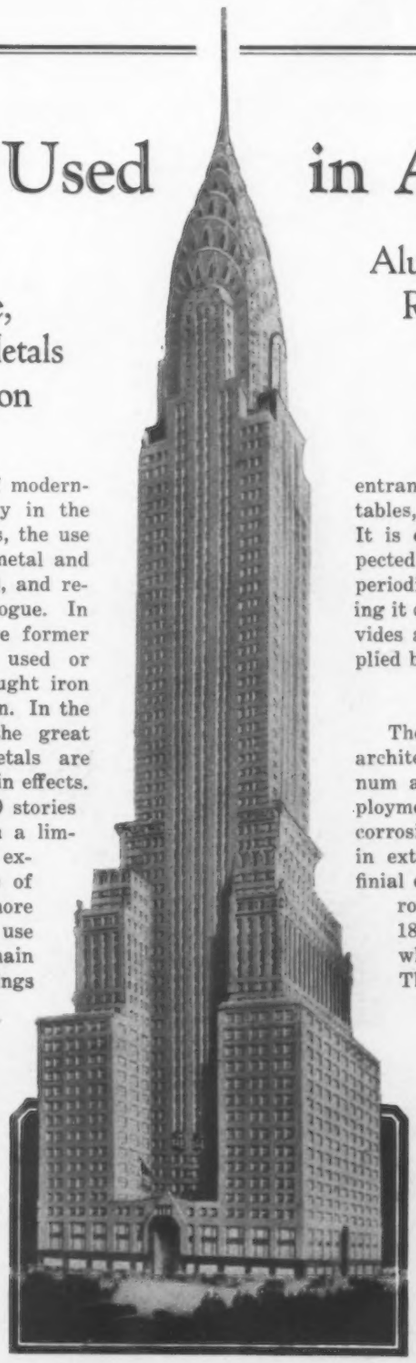
Aluminum Alloys and Rustless Iron Provide for Easy Fabrication

BY GEORGE S. HERRICK*

WITH the rapid development of modernism in architecture, especially in the design of large office buildings, the use of iron, copper, bronze, brass, monel metal and aluminum and its alloys has increased, and recently rustless iron has come into vogue. In residences and public buildings, where former periods of architecture are widely used or adapted to modern requirements, wrought iron and bronze are still used for decoration. In the modernist buildings, however, and the great skyscrapers in particular, white metals are popular with architects to obtain certain effects. As these structures rise from 40 to 60 stories and more above the street level, even a limited decorative use of metal on the exterior requires a substantial tonnage of material worth from 25c. to 60c. and more a pound. In addition to the exterior use of metals on the upper stories, the main entrances and lobbies of modern buildings are usually luxuriously decorated, and when the modernistic style is used, white metal often predominates, sometimes in combination with bronze, brass or wrought iron and at other times without contrasts.

Use of Monel Metal

Monel metal is used in small quantities, but because of its weight and price it has not been extensively specified, except in the case of the Pennsylvania Terminal in New York, where about 150,000 lb. of No. 22 gage monel metal sheets were used for the roof. Recently monel metal was used for interior metal decoration in the Union Trust Building, Detroit, a total of about 60,000 lb. being required for the grill of the main entrance, frames of tellers' windows, and for tables, elevator doors and minor decorations. It is effective as a white metal and is expected to retain its white appearance with periodic cleaning. On the exterior of a building it corrodes to a lustrous green, which provides a protective coating and is usually applied by architects with this end in view.



ABOUT 55,000 Sq. Ft. of Krupp-Nirosta Sheets Will Sheath the Tower of the Chrysler Building and More Will Be Used in Store Fronts and Decorative Features

Aluminum Widely Popular

The leading white metal in use today by architects of modernist buildings is aluminum and its alloys, two factors in its employment being lightness and resistance to corrosion. An instance of its extensive use in exterior decoration is on the tower and finial of the St. Louis Civil Courthouse. The roof is pyramidal, fabricated from No. 18 gage aluminum sheets of No. 3S alloy, which contains 1.25 per cent manganese. There are 11 steps and the base measures 92 ft. x 119 ft. 6 in. Each of the steps is 3 ft. 6 in. high and 3 ft. 9 in. wide. This sheathing required about 40,000 lb. of alloy. On the apex are two cast aluminum sphinxes resting upon cast facia. Both figures and facia were cast in sand from No. 43 alloy, which contains 5 per cent silicon. Each of the sphinxes measures 12 ft. x 12 ft. x 20 ft., but has a wall thickness of only ½ in. These, with the facia, required about 15,000 lb. of alloy.

New Building Has 42-Foot Wings

Another building, on which there is a considerable use of aluminum for exterior decoration, is being constructed for the Genesee Valley Trust Co., Rochester, N. Y., Voorhees, Gmelin & Walker, New York, architects. As a deco-

*THE IRON AGE, New York.

rative finial, the architects have specified four wings, 42 ft. high and 14 ft. wide by 4 ft. 6 in. in thickness at the widest flare of the wings. They taper to about 6 in. at the tips, which are 256 ft. 6 in. above the level of the first, or street, floor of the building. Set separately, the wings leave a circle in the center 10 ft. in diameter.

The wings are fabricated from No. 10 gage, No. 3S aluminum alloy sheets and are braced with extruded angles on the inside, which are of No. 17 ST alloy. A total of about 13,000 lb. of aluminum alloy will be used in this finial. In addition, the building is decorated with 125 spandrels, cast from No. 43 aluminum alloy, which are 4 ft. x 5 ft. and with a wall thickness of ¼ in. The total weight of the spandrels alone is between 12,000 and 15,000 lb. Exterior grill work, which is of No. 43 alloy, will require 5000 to 8000 lb. of No. 43 alloy.

AN Aluminum Pyramid Surmounted by Two Sphinxes Is the Effect of the Roof of the St. Louis Civil Court House, Which Required 15,000 Lb. of No. 43 Aluminum Alloy. Inset shows the steps forming the pyramidal roof being sheathed with aluminum alloy

Koppers Building Has 926 Alloy Spandrels

Aluminum alloy has come into extensive use for spandrels on buildings and in the Koppers Building, Pittsburgh, 926 spandrels, measuring 5 ft. square and ¼ in. thick, were used. The average weight of each spandrel was 115 lb., so there is a total of 106,590 lb. of alloy. The alloy is No. 43, an aluminum-silicon combination with 5 per cent silicon. After casting, the spandrels were deplated, a process similar to anodic treatment of aluminum, which gives various shades of gray. In the Koppers Building a leaden shade was used.

Development of rustless iron and its easy working properties has provided a new white metal as a contender with aluminum for architectural use, especially on the exterior of buildings. It has been used in small quantities for store fronts and minor decorative purposes, and some months ago was adopted for the construction of a pedestrian bridge over the street between the Chicago *Daily News* building and the building of the Chicago & North Western Railroad, as illustrated in THE IRON AGE of July 18. The exterior of the bridge, which is entirely of Alleghany metal, required 10,000 lb. all told. In addition, rustless iron was used throughout the kitchens of the cafeteria and restaurants in both buildings. Recently a modernist room was decorated in the Metropolitan Museum of Art, New York, and rustless iron sheets, highly polished, were used on the ceiling and walls, the ceiling sheets being corrugated.

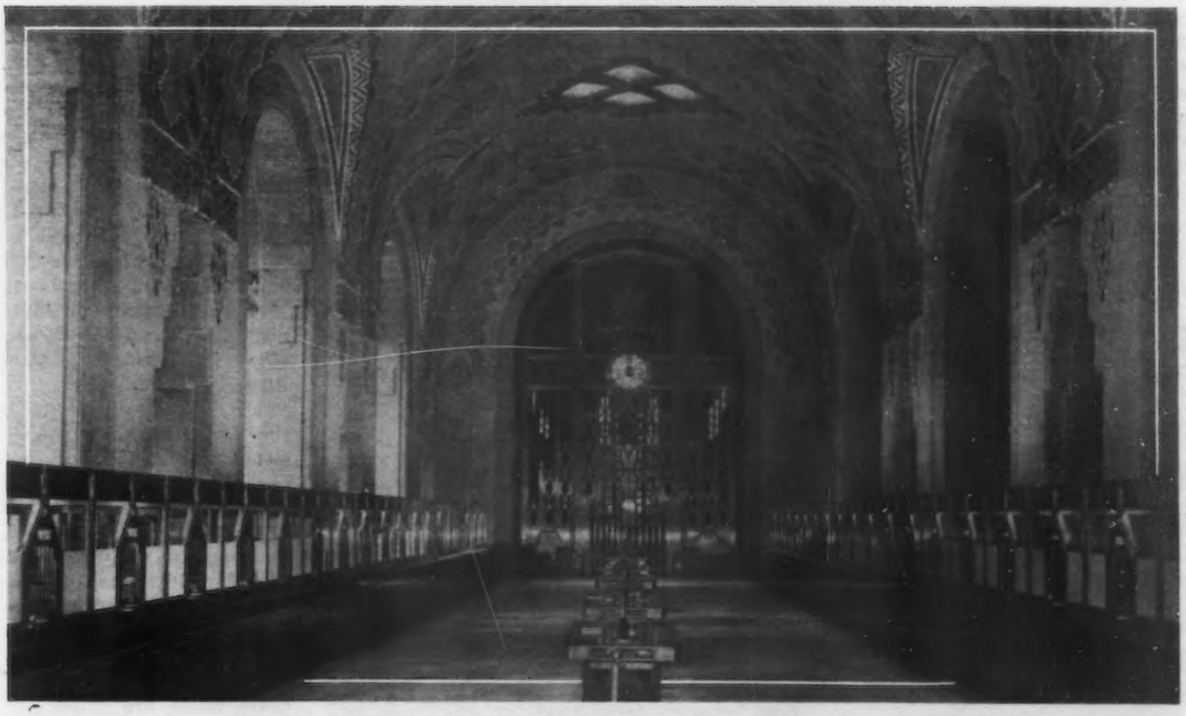
Rustless Iron Becoming a Factor

Although rustless iron has been used for some time in small and medium sized quantities for architectural decoration, especially store fronts, it was not until the exterior decorative metal for the Chrysler Building in New York was decided upon that this alloy was used as the principal feature of a large building's exterior. Tests of various metals were made by the Chrysler organization

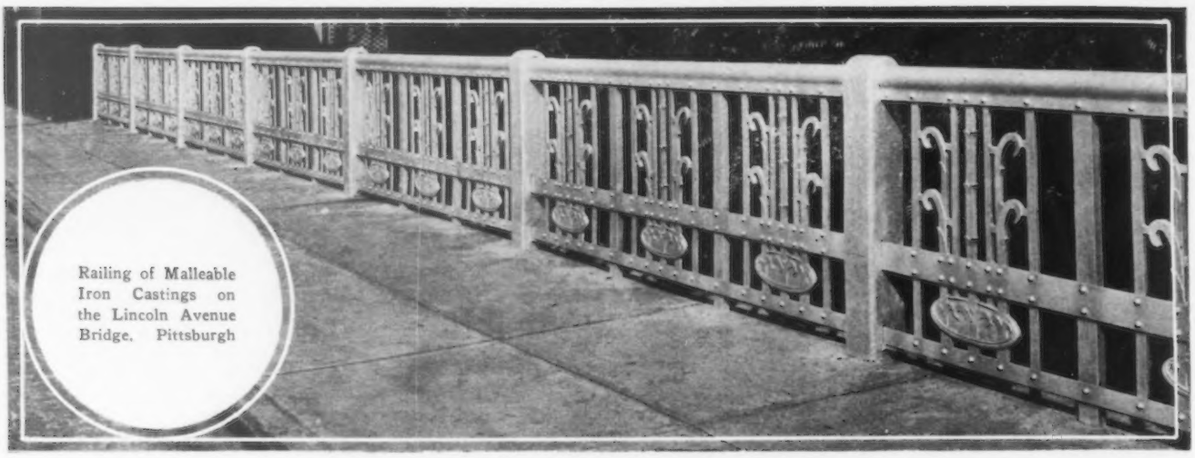
in Detroit before a decision was reached and, with the inaccessibility of a considerable portion of the exterior in mind, a metal with the greatest resistance to corrosion was considered necessary, as cleaning will be practically impossible after completion of the building. Aluminum alloy was considered and aluminum alloy spandrels are already in place between the floors of the first set-back.

Contracts for other decorative features of the exterior are being awarded and a considerable portion of the material thus far decided upon will be Nirosta, to be furnished by the Crucible Steel Co. of America, Ludlum Steel Co. and Central Alloy Steel Co., three of the licensees under the Krupp-Nirosta patents. When completed, the tower of the building will be roofed with about 55,000 sq. ft. of No. 24 gage Nirosta sheets, and rustless iron is also planned

for decorative features, which include 24 hub caps, four radiator caps with the Chrysler wings, eight gargoyles and seven pineapple urns. An estimate of the size of these decorations is possible from the fact that the urns are 7 ft. 6 in. high and 3 ft. in diameter. While 24-gage sheets are to be used on the roof, No. 14 gage sheets will be used on the store fronts, window frames, moldings and other trim on the street and first and second stories. For the first two stories above the street, about 50,000 lb. of Nirosta will be used in the form of sheets, strips and casement window sections. Rustless iron for the grillwork of the main entrance and lobby is being considered. As a desirable decoration to balance the extensive use of this material on the tower, it is planned to install etched and enameled, rustless iron elevator doors in the lobby.



IN the Large Screen, Which Fills the Archway of the Lobby, in Counter Screens and Desks in the Union Trust Co., Detroit, 60,000 Lb. of ⅛ to ¼-In. Monel Metal Sheets Were Used with a Cathedral-like Result. Spandrels on the Koppers Building, Pittsburgh, required 106,590 lb. of No. 43 aluminum alloy, deplated to obtain a leaden gray shade (above)



Railing of Malleable Iron Castings on the Lincoln Avenue Bridge, Pittsburgh

Making Large Malleable Castings

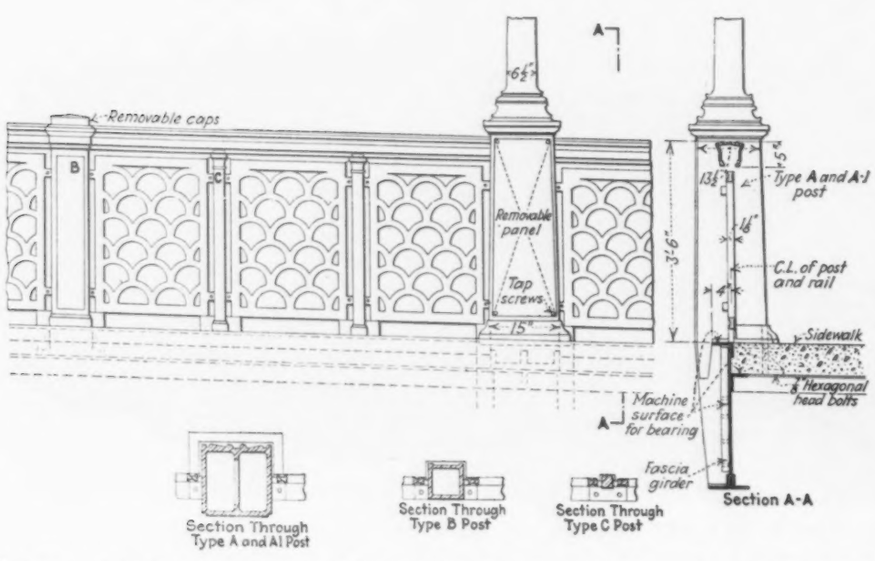
Field No Longer Restricted to Small Product— Posts and Railings for Large Pittsburgh Bridges Stand Severe Tests

BY EDWIN F. CONE

NO longer is the field for malleable iron restricted to the production of small or medium weight castings. It has been demonstrated on a large scale that castings can now be successfully made of weights and dimensions that heretofore were deemed impossible.

Malleable iron castings have entered a new field. They have been incorporated in the railings for the new Liberty Bridge which spans the Monongahela River in the down town district of Pittsburgh. The production of such castings is regarded as a decided departure from customary practice and has been successfully undertaken by the Fort Pitt Malleable Iron Co. of Pittsburgh. The bridge, in which large malleable iron castings have been incorporated, connects Forbes Street and the Boulevard of the Allies on the north side of the Monongahela River with the new Liberty tubes on the south side.

Built of steel, the bridge is 2663 ft. long, exclusive of approaches. It rises to the height of 125 ft. above the channel of the river. It is, therefore, evident that for a bridge of this size the hand rails should not only be large, to harmonize with the general appearance of the structure, but also have sufficient strength to afford adequate protection to vehicles passing over the bridge. The engineers after careful consideration selected malleable iron as entirely suited to the requirements. It is claimed that this is the first use of this metal for bridge railing in the Pittsburgh district, and probably in the country.



Details of the Railing and Posts of Malleable Iron Castings in the Liberty Bridge at Pittsburgh

From information furnished by F. W. Groh, engineer of steel inspection, Allegheny Department of Public Works, Pittsburgh, the specification requirements for malleable iron castings on this undertaking called for a tensile strength of 50,000 lb. per sq. in. with an elongation of 10 per cent. The Fort Pitt company had no trouble in meeting these specifications, and takes pride in exhibiting physical tests on a large number of heats which are rather remarkable for their uniformity. The actual physical results of the material incor-

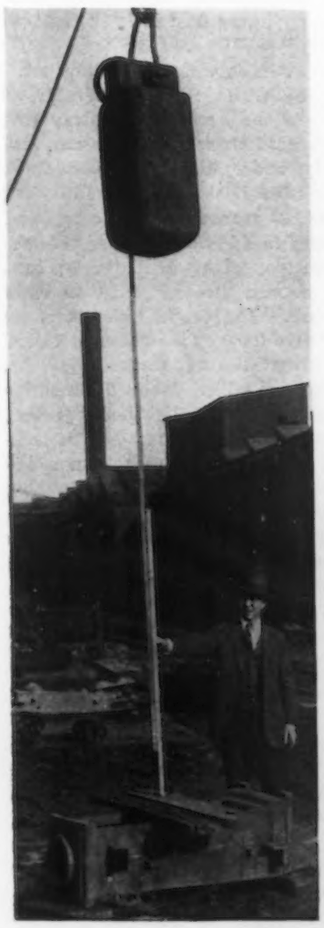
porated in the posts and railings approximated 59,000 lb. per sq. in. with a yield point of close to 39,000 lb. per sq. in. The elongation in 2 in. was about 25.5 per cent, with a reduction of area practically the same.

Impact tests upon the malleable iron showed some interesting results. They were made on cast wedges, ½ x 1 in. at the base, and tapered down to what was practically a knife edge, over a length of 6 in. The method of making the test was to clamp the base of the wedge in a vise, holding it in a vertical position while a weight was repeatedly dropped upon it, which produced a blow of about 70-ft. lb. The result was that the wedge curled in the form of a scroll in almost every case and an average of 33 blows was obtained in these tests. No fracture was detected in the wedges. Both tensile and impact tests were made on every heat which was incorporated in the castings for this bridge.

To determine the impact which some of the castings would withstand, other tests were made on various parts of the railing. The type of casting used and the general dimensions is shown in one of the illustrations. Another illustration represents the testing of a malleable iron post used in the railing. The test consisted in dropping a weight of 2750 lb. a distance of approximately 15 ft. as shown. In another illustration engineers of Allegheny County, who supervised the installation of the railings, are shown measuring deflections on these posts after the weight had been dropped. In still another illustration, an engineer is measuring the deflections of a section of the railing after it had been bent under the ram of a 50-ton Lucas press. After these tests, none of the castings showed any sign of fracture.

The castings are described as highly suitable from an ornamental viewpoint and it is stated that the engineers are satisfied with the excellent physical qualities and the severe impacts which the castings have withstood in all the tests. Highway and guide rails of the Ramsay and similar types have been installed at numerous places and have proved satisfactory and efficient in service. Among other installations than the Liberty Bridge, the castings recently placed on the Lincoln Avenue Bridge in the East Liberty section of Pittsburgh may be cited.

Some rather striking examples of the utility of these castings have come to light as the result of automobile



TESTING the Impact Strength of One of the Malleable Iron Posts by Dropping a 2750-lb. Weight from a Height of 15 Ft. (Above)

MEASURING the Deflection in One of the Posts After the Drop Test (At Right)

DETERMINING the Deflection in a Section of One of the Railings After Bending It Under a 50-Ton Press (Below)

accidents. A touring car with the full number of passengers was crossing the Lincoln Bridge at a speed in excess of 50 miles an hour and in some manner jumped the curb and collided with the railing. A special tee part construction of this railing, located at the height of the hub cap of the car, bore the brunt of the impact and so straightened out the car that it proceeded on its way under full control. Upon investigation and check-up of the panel which withstood the collision, it was found that the metal had been deflected only 17/32 inch.

A similar accident occurred on the Liberty Bridge. In this case the car was practically ruined, but the railing suffered little or no damage. In another accident on the Liberty Bridge a large car, full of people, jumped the curbing and ran into a railing with sufficient force to bend it about 14 in., totally wrecking the car with no injury to the passengers.

It is felt by people interested in the future of malleable iron castings that a new field has been opened up whereby this material can find extensive use in large castings instead of being confined, as in the past, to small ones.

About 800,000 Rails Tested Electrically for Flaws

CONSIDERABLE success has been attained in the non-destructive internal testing of steel rails for the detection of flaws, particularly transverse fissures. This was brought out in a paper on non-destructive testing presented at the annual meeting of the American Society for Steel Treating at Cleveland, during the National Metal Congress in September. The paper was written by Elmer A. Sperry, president, Sperry Development Co., Inc., Buffalo, N. Y., and read by H. C. Drake of that company. The method was described in THE IRON AGE, Nov. 15, 1928, in an abstract of a paper presented by Mr. Sperry before the American Iron and Steel Institute.

Direct current of high amperage is passed through the specimen and any minute crack or inclusion produces a deviation in the axis of current flow. This deviation is detected and amplified to a value suitable for operating recording equipment. The equipment used for testing consists of a standard track maintenance trailer car carrying a power plant, radio apparatus and recording mechanism. This car is operated at a speed of 5 miles per hr., being hauled by a separate motor car.

Contact brushes go on the top surface of the rail and between these the current flows. Small potential brushes or equivalent searching equipment pick up the difference in potential. The microvoltage is carried to a set of four radio tubes. A paint spraying device is provided, a relay controlling the release of the spray of paint against the side of the rail whenever a defect is found. Fissures are indicated on the friction driven moving strip of paper.

Two detector cars have made permanent records of about 800,000 rails showing the condition of their internal structure and the paper stated that hundreds of transverse fissures have been accurately located and the rails removed from the track. Although the detection of transverse fissures was the primary object of the test cars, the paper stated that they are also locating compound and horizontal fissures, piped rails, split heads and other discontinuities in the rail head. From the data obtained it was found that the number of fissures per mile varies widely, the minimum being about 0.2 and the maximum 3.1 per mile. The device, it was stated, has been successfully adapted to the inspection of a great variety of parts such as new rails at mills, bars, car axles, boiler plate and welded joints.

Not a Cure-All for Transverse Fissures

E. W. Carruthers, Pennsylvania Railroad, Altoona, Pa., said that in a test of over 14,000 rails 21 were removed because of indications of interior defects. Drop tests, in a laboratory, on rails which the detector indicated had transverse fissures, showed that the detector was not always accurate. In his opinion the detector, in its present state of development, cannot be called highly successful, although he said the method is promising and its results are encouraging. He pointed out that there are various factors in actual operation which prevent the detector from working as satisfactorily in the field as in the laboratory.

Results of his experiences in detecting rail flaws with the apparatus were given by W. C. Barnes, engineer of tests of the rail committee of the American Railway Engineering Association. He said that a detector car had been operated continuously under his supervision since last fall. During eight months 1800 miles of rails were tested on 17 railroads and 145 transverse and compound internal fissures were located in addition to other defects. In the opinion of his committee, defects that develop into transverse fissures under service stresses exist in rails when received from the mill. The original defect is so small that only a very sensitive form of the Sperry method could locate it. He hoped that the apparatus would be used for testing rails at the rail mills. Many fissures, he said, are being removed by the use of the Sperry tester, probably all that are immediately dangerous, but he said it is not yet possible with the device to detect minor fissures which will later develop into menaces.

Mr. Drake in closing the discussion said that the criticism made by Mr. Carruthers was based on observations from the use of the first detector car. Since this one was placed in operation some changes have been made, resulting in an improvement in the efficiency of the testing method.

Iron Oxide in Steel Higher Than Supposed

During the past three years numerous writers and investigators have attempted to estimate the amount of iron oxide in open-hearth steel by calculation and by analysis. Experimental work conducted by the members of the metallurgical section of the Pittsburgh Experiment Station of the United States Bureau of Mines, in cooperation with Carnegie Institute of Technology and the Metallurgical Advisory Board, has shown that the amount of iron oxide dissolved in liquid steel in the open-hearth is very much higher than had been thought heretofore.

Apparently, reaction between carbon and oxygen is slow enough so that the metal is essentially saturated with iron oxide with respect to the slag under a rather wide range of conditions in the open-hearth furnace. This fact changes the concept of methods of working open-hearth heats to a considerable extent in that it emphasizes the importance of chemical composition and physical properties of the slag and the necessity for an even more careful study of deoxidizers than has been carried out up to the present time.

An Appraisal of Carbide Tools

Discovery of Tungsten Carbide, Method of Manufacturing Carbide Tools, Representative Performance in Various Uses, and Future Influence

BY DR. ZAY JEFFRIES*

THE base metal of cemented tungsten carbide is tungsten. The hard component is tungsten carbide. It has long been known that ferrotungsten containing large percentages of carbon is excessively hard and also very brittle. About 1898, Moissan produced in the electric furnace a material from tungsten oxide and carbon which he described as a carbide of tungsten. There were no very accurate methods for determining hardness in those days, but the hardness was sufficient to attract Moissan's attention.

About 1904 Just and Hanamann of Budapest, Austria, invented the squirted, or pressed, filament of tungsten for incandescent lamps. They produced, in one stage, tungsten containing a small amount of carbon. Such filaments were so brittle and fragile that it seemed doubtful whether they could become commercial. In fact, as little as 0.10 to 0.25 per cent carbon in such filaments rendered them not only brittle, hot and cold, but so fragile that a large percentage were broken at the touch.

Tungsten Carbide Itself Is Extremely Brittle

Tungsten filaments, therefore, engaged in a battle against carbon from about 1904 until the present time. Even now, at times, carbonaceous material gets into the lamp and a little tungsten carbide forms at the grain boundaries near where the tungsten filament is joined to the leading-in wires. The filament then becomes so fragile that a slight jar on the lamp breaks it and destroys the lamp.

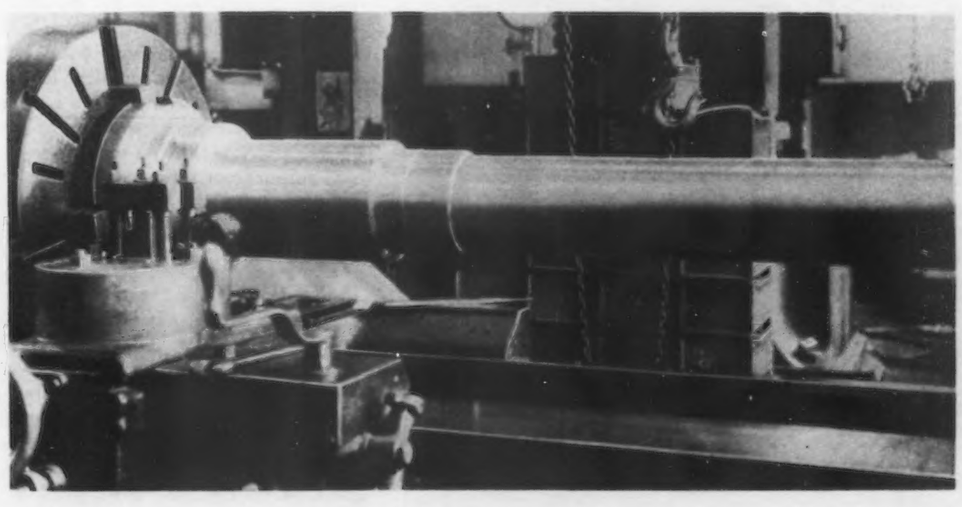
In another process of treating tungsten wire, the filament is heated to a temperature of around 1200 deg. C., usually in an atmosphere of hydrogen. It was early learned that if any hydrocarbon were present (such as by introducing a little kerosene, alcohol or fuel gas), within one second the filament became so brittle and fragile that it could be broken to pieces in the fingers. This, notwithstanding the fact that the filament before heat treatment had a tensile strength of 600,000 lb. per sq. in., and was quite ductile. The percentage of carbon which produced this effect was so small that at times it was difficult to detect it by chemical analysis.

Massive or fused tungsten carbide has been known since the time of Moissan, or for more than 30 years. It may seem rather strange that a material so fragile as tungsten containing a little carbon could be transformed into the tough cutting tool which does not resemble, in any physical property except hardness, the brittle tungsten carbide which was considered worthless for so many years.

Manufacture of Carbide Tools

Creation of these new tools represents a new metallurgy. The old metallurgy, especially of tools, was essentially one of fusion. The tool was either used in the cast condition, with or without heat treatment, or after forging plus heat treatment. The present cemented tungsten carbide is produced by first manufacturing a very fine powder of tungsten carbide; the fine powder is mixed with metallic cobalt and the mixture is then ground in a ball-mill and the ductile cobalt, as Doctor Hoyt has shown, is smeared over the surface of the microscopic particles of carbide. The mixture is then pressed into any desired shape and size. It may then be partially sintered by heating to a low temperature, after which it can be handled

*Consulting metallurgist, Cleveland. This article is abstracted from an address to the Machine Shop Practice Division of the American Society of Mechanical Engineers, Cleveland, Oct. 1.



IN Turning Nickel - Chromium Billets, Carboloy Tools Have Been Used for Four to Five Hours Without Perceptible Wear

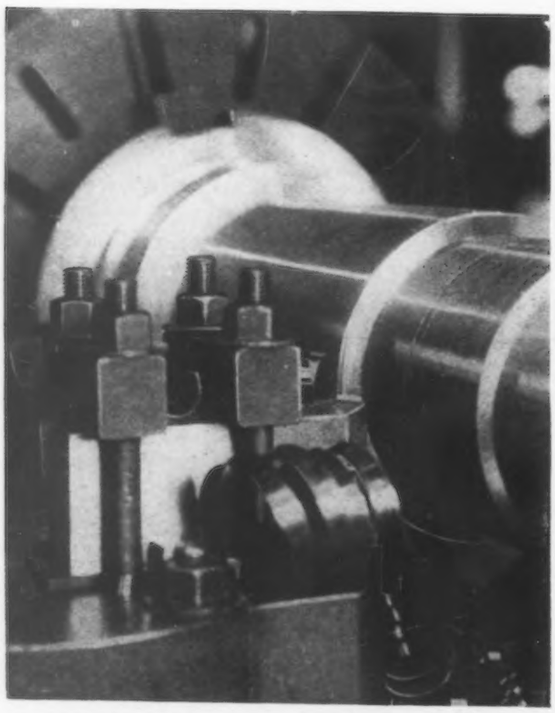
without breaking, but it is not machinable in the sense that the metal can be cut by an ordinary tool. It can be shaped with an ordinary knife or simple steel tool because the partially sintered powder can be removed with ease from the remaining material until the main mass is shaped to the form desired.

This mass of material which is left, after scraping or grinding off what is not wanted, is then reheated to a brilliant white heat in an electric furnace with a hydrogen atmosphere. That is the true cementing operation and the cobalt is the cementing material. The cobalt does not remain pure because it takes up a little of the tungsten carbide in the process, but essentially the finished product consists of minute particles of tungsten carbide cemented together with cobalt or with cobalt containing some tungsten and carbon in solution.

Commercial Development of the Idea

Development took place in Germany by the Osram lamp works of Berlin, and the two men who are given the major credit are Baumhauer and Schroeter. First it was used in dies for drawing tungsten and molybdenum wire at elevated temperatures. Dr. S. L. Hoyt of the research laboratory, General Electric Co., started work several years ago along these lines; he added a number of things to the development, and others have added still different things. Cemented tungsten carbide of today, therefore, represents the work of many people in Germany and in this country as well.

While I am associated with one of the companies manufacturing and selling cemented tungsten carbide in America, namely, the Carboloy Co., Inc., there are three other main channels of manufacture or distribution in the United States. One is Thomas Prosser & Son, who deal with imported cemented tungsten-carbide material made by the Krupp company in Germany. Others are Firth-Sterling Steel Co., which manufactures and sells a similar material under the trade name "Dimondite," and Ludlum Steel Co., dealing in a similar material known as "Strauss metal." I have obtained certain information from them and their opinion of the present status of this industry in America, so that I may present a composite picture. No distinction will be made nor implied as between one brand of cemented tungsten carbide and another.



CLOSE-UP of Rugget Tool and Support for Heavy Cut On Nickel-Chromium Test Log. Speed is 70 ft. per min., twice that expected of high-speed tools

Physical Properties of Cemented Tungsten Carbide

In density cemented tungsten carbide ranges between 14 and 15, a relatively high figure. It is difficult to appraise its true hardness. It has a very high resistance to abrasion. Its resistance to indentation is relatively less than one might expect from this fact. Tungsten carbide itself has a hardness comparable to sapphire or corundum. Scratch hardness of the cemented material is equal to the hardness of the hardest constituent, hence is equal to the hardness of tungsten carbide. Indentation is perhaps a little easier due to the presence of cobalt and hence is relatively low. Rockwell hardness measurements on the C scale will not suffice; a smaller load is used, and a special hardness scale has been developed for these carbide materials.

There is perhaps no test for wear quite equal to the service of tools in use, so that the appraisal of that factor is left to the user.

Whereas high-speed steel requires a special heat treatment to develop its hardness and its red hardness, cemented tungsten carbide is fully hard after cooling to room temperature from the high temperature sintering operation. It can be reheated to a very high temperature and cooled either rapidly or slowly, and it is still hard. Its red hardness surpasses that of any other metallic substance used by industry. No one knows just how hard it is at the high temperature, nor at what rate its hardness decreases at very high temperatures. It appears that temperatures ordinarily reached even in severe industrial operations are not high enough to affect materially the hardness at that temperature.

There are several ways of making this material and there are two or three different grades now available to the trade. These grades differ both in composition, in treatment during preparation, and in physical properties as well.

One of the grades contains about 87 per cent of tungsten carbide and 13 per cent of cobalt. It is tough, having a calculated tensile strength (as determined by the transverse test) of 300,000 lb. per sq. in. It has a high compressive strength, one determination being 540,000 lb. per sq. in., the highest of any material which has been measured in our laboratory.

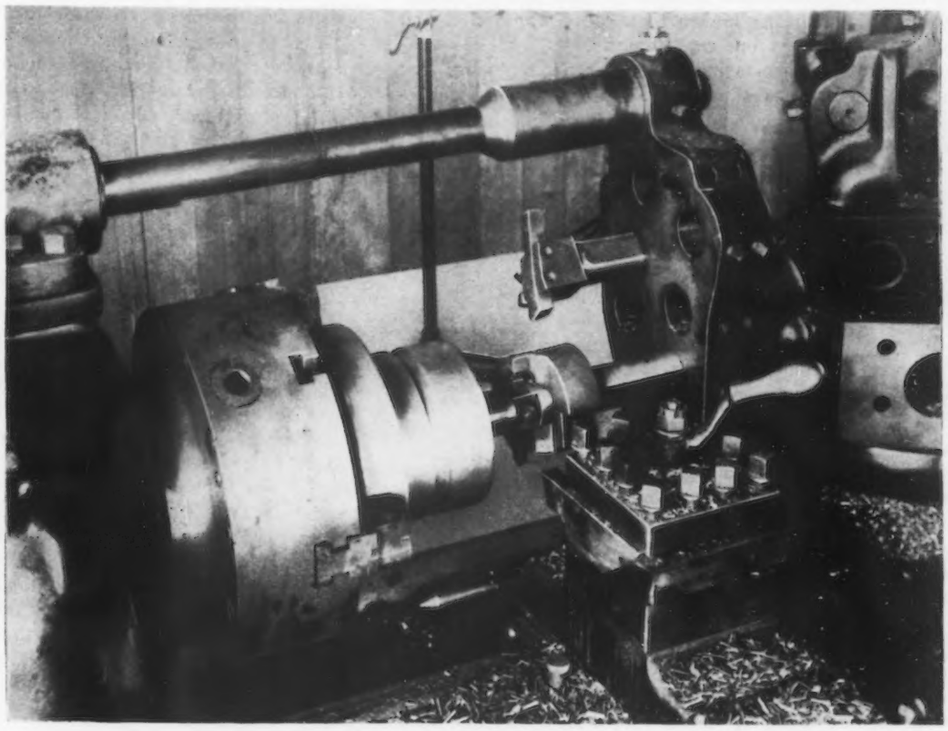
Another grade, containing about 6 per cent of cobalt, is somewhat harder to the indentation test; considerably harder as measured by the abrasion or wear test, and not so strong as measured by the transverse breaking test.

The industry is so new that the multiplication of grades has not reached the public. It is possible, however, by slight changes in composition and in methods of manufacture to produce quite a range of properties, and it seems practically certain that as time goes on the industry itself will select from these possibilities what best suits its own purposes.

High Price Does Not Prevent Savings from Use

Cemented tungsten-carbide material is now offered to the trade at a relatively high price. It is, in round numbers, $450 per lb. It is a price which none of us expect will be maintained; it is now justified by the fact that the industry is in the process of development, and development costs a great deal of money. In spite of the price, we find that the customer uses the material at a distinct saving to himself.

If you are using the tools at a saving to yourselves then, of course, you don't need to have the price come down to effect some saving, and if you are waiting for the



CARBOLOY Tools Set Up for Cast Iron Bushing. Note particularly the boring tool, which has a ½-in. square tool bit. It is operated at an average depth of cut of 7/16-in. by 0.020-in. feed and speed of 179 ft. per min. It made cuts totalling a depth of 5451 ft. without showing sign of wear. Rigidity of mounting is visible in the 4-in. standard cutter head

price to come down before starting the use of the tools, that is your own loss, provided at present prices you can effect a saving. Everyone knows that in the course of time the price of this material will be brought into a range commensurate with the cost of exploitation.

Being a high-priced material, it is utilized by the insertion of a piece of cemented tungsten carbide on a bit of a cheaper material, usually some grade of steel. This has given rise to what is known as the tipping problem. This problem has been taken care of in a number of ways. It may not be all that is desired at the present time, and you can expect improvements in the future. But in most cases it has been entirely satisfactory to put the cemented tungsten-carbide tips on steel shanks by copper brazing in an atmosphere of hydrogen.

There seems to be a preference for the welded tip for larger tools. Welding is attended by the hazard of cracking the cemented tungsten carbide itself, but when properly manipulated this hazard can be overcome.

Both the welded-on tips and the brazed tips have given satisfactory service. An insufficient number of people are conversant with the art of tipping, however, to insure that individual pieces can be distributed haphazard and anything like success can be achieved in the attempts to braze or tip these pieces to steel shanks in the users' tool rooms. On the other hand, some shops have tackled this problem and are in a position to mount their own tools. If a concern has only a little of the tipping to do it is probably best to permit the manufacturer of the tool material to make the tools.

The next problem in connection with the manufacture of a tool is grinding. Several companies in the United States sell suitable grinding wheels. Those which have given the best results familiar to me are artificial abrasives of the silicon-carbide family, such as carborundum or crystolon. A year ago, the matter of grinding these tools was a serious problem, but at the present time it may be said that almost anyone can grind these tools.

It seems to have a tremendous field for wiredrawing dies. Two examples may be cited, one drawing screen wire 0.0108 in. diameter, the other drawing larger wire 0.105 in. diameter. In one field it competes with the diamond die, and in the other with the chilled iron die. In the first case the cemented tungsten-carbide die drew 57,800,000 ft. of 0.0108-in. wire, with a wear of 0.0007 in. In this size the performance was approximately equivalent to that of a diamond die, but its usefulness was not completely exhausted. The overall improvement in cost on a performance basis over the diamond die was 6 to 1.

The second example is drawing the larger steel wire. In a 12-day period, 264 chilled iron dies were used in this duty. Over the same period one cemented tungsten-carbide die performed without "drawing out," i.e., going off size. We had, therefore, one cemented tungsten-carbide die taking the place of 264 chilled iron dies. On a basis of die cost alone, the carbide was cheaper than the chilled iron by a ratio of 36.6 to 18. In addition, more wire was produced during the 12-day period the cemented tungsten-carbide die was in use.

In more specialized service cemented tungsten-carbide dies are being used for hot-drawing fine wires of tungsten and molybdenum, and we will perhaps hear more in the future about its use in hot-drawing other materials.

Tungsten carbide is also used in blanking dies, particularly by the General Electric Co., in punching out transformer disks. It produces a shape free from burrs; after cutting 200,000 parts, the first one and the last one appeared to be just alike.

Cutting on Hard or Abrasive Non-Metallics

It is also used for cutting materials which no other metallic material has been able to cut. In that sense cemented tungsten carbide is opening up a new field for machining. It can machine glass, porcelain and compounds used in the electrical industry such as micalex and ivory. It machines various fibrous non-metallic materials which are abrasive, those containing mixtures of asbestos and other materials used in brake-linings, for example, and molded products of the bakelite type. In some instances it replaces diamond tools, but in other instances it

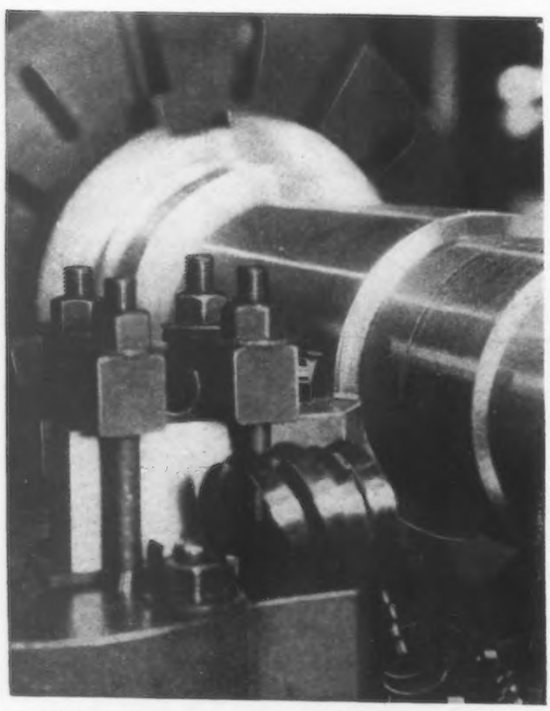
without breaking, but it is not machinable in the sense that the metal can be cut by an ordinary tool. It can be shaped with an ordinary knife or simple steel tool because the partially sintered powder can be removed with ease from the remaining material until the main mass is shaped to the form desired.

This mass of material which is left, after scraping or grinding off what is not wanted, is then reheated to a brilliant white heat in an electric furnace with a hydrogen atmosphere. That is the true cementing operation and the cobalt is the cementing material. The cobalt does not remain pure because it takes up a little of the tungsten carbide in the process, but essentially the finished product consists of minute particles of tungsten carbide cemented together with cobalt or with cobalt containing some tungsten and carbon in solution.

Commercial Development of the Idea

Development took place in Germany by the Osram lamp works of Berlin, and the two men who are given the major credit are Baumhauer and Schroeter. First it was used in dies for drawing tungsten and molybdenum wire at elevated temperatures. Dr. S. L. Hoyt of the research laboratory, General Electric Co., started work several years ago along these lines; he added a number of things to the development, and others have added still different things. Cemented tungsten carbide of today, therefore, represents the work of many people in Germany and in this country as well.

While I am associated with one of the companies manufacturing and selling cemented tungsten carbide in America, namely, the Carboloy Co., Inc., there are three other main channels of manufacture or distribution in the United States. One is Thomas Prosser & Son, who deal with imported cemented tungsten-carbide material made by the Krupp company in Germany. Others are Firth-Sterling Steel Co., which manufactures and sells a similar material under the trade name "Dimondite," and Ludlum Steel Co., dealing in a similar material known as "Strauss metal." I have obtained certain information from them and their opinion of the present status of this industry in America, so that I may present a composite picture. No distinction will be made nor implied as between one brand of cemented tungsten carbide and another.



CLOSE-UP of Rugget Tool and Support for Heavy Cut On Nickel-Chromium Test Log. Speed is 70 ft. per min., twice that expected of high-speed tools

Physical Properties of Cemented Tungsten Carbide

In density cemented tungsten carbide ranges between 14 and 15, a relatively high figure. It is difficult to appraise its true hardness. It has a very high resistance to abrasion. Its resistance to indentation is relatively less than one might expect from this fact. Tungsten carbide itself has a hardness comparable to sapphire or corundum. Scratch hardness of the cemented material is equal to the hardness of the hardest constituent, hence is equal to the hardness of tungsten carbide. Indentation is perhaps a little easier due to the presence of cobalt and hence is relatively low. Rockwell hardness measurements on the C scale will not suffice; a smaller load is used, and a special hardness scale has been developed for these carbide materials.

There is perhaps no test for wear quite equal to the service of tools in use, so that the appraisal of that factor is left to the user.

Whereas high-speed steel requires a special heat treatment to develop its hardness and its red hardness, cemented tungsten carbide is fully hard after cooling to room temperature from the high temperature sintering operation. It can be reheated to a very high temperature and cooled either rapidly or slowly, and it is still hard. Its red hardness surpasses that of any other metallic substance used by industry. No one knows just how hard it is at the high temperature, nor at what rate its hardness decreases at very high temperatures. It appears that temperatures ordinarily reached even in severe industrial operations are not high enough to affect materially the hardness at that temperature.

There are several ways of making this material and there are two or three different grades now available to the trade. These grades differ both in composition, in treatment during preparation, and in physical properties as well.

One of the grades contains about 87 per cent of tungsten carbide and 13 per cent of cobalt. It is tough, having a calculated tensile strength (as determined by the transverse test) of 300,000 lb. per sq. in. It has a high compressive strength, one determination being 540,000 lb. per sq. in., the highest of any material which has been measured in our laboratory.

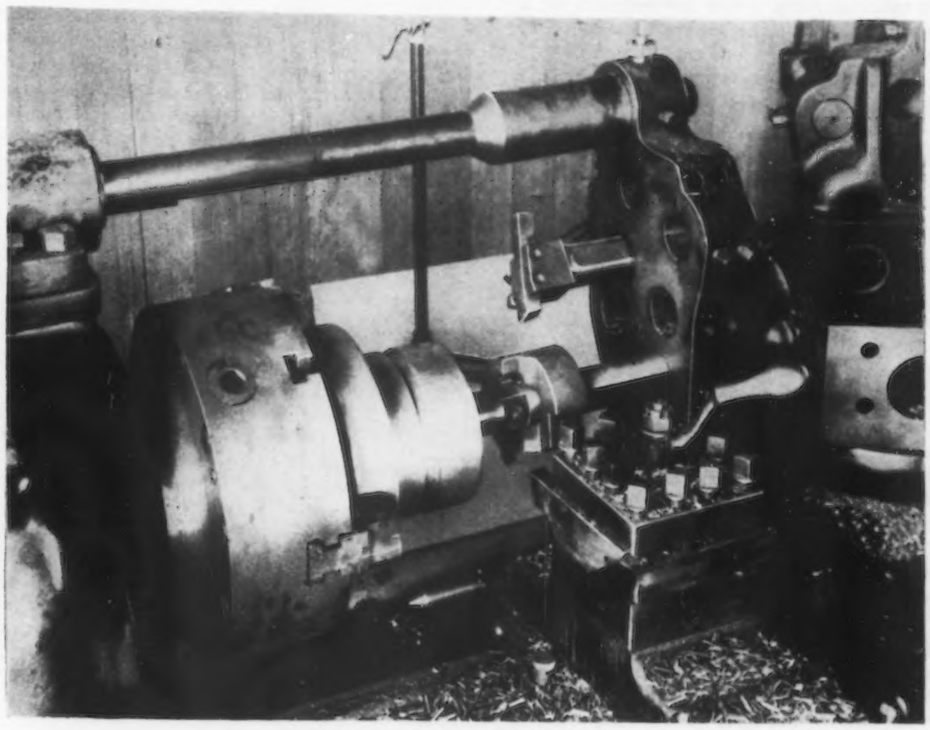
Another grade, containing about 6 per cent of cobalt, is somewhat harder to the indentation test; considerably harder as measured by the abrasion or wear test, and not so strong as measured by the transverse breaking test.

The industry is so new that the multiplication of grades has not reached the public. It is possible, however, by slight changes in composition and in methods of manufacture to produce quite a range of properties, and it seems practically certain that as time goes on the industry itself will select from these possibilities what best suits its own purposes.

High Price Does Not Prevent Savings from Use

Cemented tungsten-carbide material is now offered to the trade at a relatively high price. It is, in round numbers, $450 per lb. It is a price which none of us expect will be maintained; it is now justified by the fact that the industry is in the process of development, and development costs a great deal of money. In spite of the price, we find that the customer uses the material at a distinct saving to himself.

If you are using the tools at a saving to yourselves then, of course, you don't need to have the price come down to effect some saving, and if you are waiting for the



CARBOLOY Tools Set Up for Cast Iron Bushing. Note particularly the boring tool, which has a ½-in. square tool bit. It is operated at an average depth of cut of 7/16-in. by 0.020-in. feed and speed of 179 ft. per min. It made cuts totalling a depth of 5451 ft. without showing sign of wear. Rigidity of mounting is visible in the 4-in. standard cutter head

price to come down before starting the use of the tools, that is your own loss, provided at present prices you can effect a saving. Everyone knows that in the course of time the price of this material will be brought into a range commensurate with the cost of exploitation.

Being a high-priced material, it is utilized by the insertion of a piece of cemented tungsten carbide on a bit of a cheaper material, usually some grade of steel. This has given rise to what is known as the tipping problem. This problem has been taken care of in a number of ways. It may not be all that is desired at the present time, and you can expect improvements in the future. But in most cases it has been entirely satisfactory to put the cemented tungsten-carbide tips on steel shanks by copper brazing in an atmosphere of hydrogen.

There seems to be a preference for the welded tip for larger tools. Welding is attended by the hazard of cracking the cemented tungsten carbide itself, but when properly manipulated this hazard can be overcome.

Both the welded-on tips and the brazed tips have given satisfactory service. An insufficient number of people are conversant with the art of tipping, however, to insure that individual pieces can be distributed haphazard and anything like success can be achieved in the attempts to braze or tip these pieces to steel shanks in the users' tool rooms. On the other hand, some shops have tackled this problem and are in a position to mount their own tools. If a concern has only a little of the tipping to do it is probably best to permit the manufacturer of the tool material to make the tools.

The next problem in connection with the manufacture of a tool is grinding. Several companies in the United States sell suitable grinding wheels. Those which have given the best results familiar to me are artificial abrasives of the silicon-carbide family, such as carborundum or crystolon. A year ago, the matter of grinding these tools was a serious problem, but at the present time it may be said that almost anyone can grind these tools.

It seems to have a tremendous field for wiredrawing dies. Two examples may be cited, one drawing screen wire 0.0108 in. diameter, the other drawing larger wire 0.105 in. diameter. In one field it competes with the diamond die, and in the other with the chilled iron die. In the first case the cemented tungsten-carbide die drew 57,800,000 ft. of 0.0108-in. wire, with a wear of 0.0007 in. In this size the performance was approximately equivalent to that of a diamond die, but its usefulness was not completely exhausted. The overall improvement in cost on a performance basis over the diamond die was 6 to 1.

The second example is drawing the larger steel wire. In a 12-day period, 264 chilled iron dies were used in this duty. Over the same period one cemented tungsten-carbide die performed without "drawing out," i.e., going off size. We had, therefore, one cemented tungsten-carbide die taking the place of 264 chilled iron dies. On a basis of die cost alone, the carbide was cheaper than the chilled iron by a ratio of 36.6 to 18. In addition, more wire was produced during the 12-day period the cemented tungsten-carbide die was in use.

In more specialized service cemented tungsten-carbide dies are being used for hot-drawing fine wires of tungsten and molybdenum, and we will perhaps hear more in the future about its use in hot-drawing other materials.

Tungsten carbide is also used in blanking dies, particularly by the General Electric Co., in punching out transformer disks. It produces a shape free from burrs; after cutting 200,000 parts, the first one and the last one appeared to be just alike.

Cutting on Hard or Abrasive Non-Metallics

It is also used for cutting materials which no other metallic material has been able to cut. In that sense cemented tungsten carbide is opening up a new field for machining. It can machine glass, porcelain and compounds used in the electrical industry such as micalex and ivory. It machines various fibrous non-metallic materials which are abrasive, those containing mixtures of asbestos and other materials used in brake-linings, for example, and molded products of the bakelite type. In some instances it replaces diamond tools, but in other instances it

can machine parts which heretofore could not be shaped economically with any known tool. Just where that will lead in the future no one really knows.

The material is also used to saw rock, replacing saw teeth of other material, so that, outside of the machine tool industry itself, cemented tungsten carbide has potentially a wide application.

A saw with insert teeth, 16 in. diameter, when cutting artificial lumber made of magnesia, asbestos and wood shavings, could be increased in speed from 900 to 1600 r.p.m. The steel saw cut 80 ft. of board between grinds and cemented tungsten carbide 1520; these figures represent a 78 per cent increase in speed, and 1800 per cent increase in footage between grinds.

Ivory is turned at 6000 ft. a minute, hand feed, with only a skin cut, but the result is about the same as that obtained with the diamond tool.

Extraordinary Production on Metal Work

Let me give a few examples of tool replacement when cutting metal. It should be obvious that machines designed to use tools with different physical properties might not be able to take full advantage of this new material. Nevertheless it is interesting to see what performance one actually gets.

For example, when turning armatures, one armature per grind with the best steel tool. With cemented tungsten carbide we get 40 armatures per grind; the speed is 700 ft. a minute, and 1/64-in. cut. In rough and finished turning on commutators, the old record was 150 commutators per grind; with cemented tungsten carbide, 30,000 per grind.

In a cut-off tool, the old performance was 100 cuts per grind; with cemented tungsten carbide, 15,000 per grind.

For an example of profiling 1020 S. A. E. steel at very high speed, take the old practice of 60 pieces between grinds and compare with cemented tungsten carbide, 25,000 pieces.

When boring a main transmission bearing in cast iron, 4½-in. diameter, 100 to 125 pieces could be produced per grind with the old tools; 950 with cemented tungsten carbide.

An interesting thing developed when finish boring bronze bushings to a tolerance of 0.0005 in. The old record with existing tools was 150 pieces per grind, and 7000 with carbide. In addition to this economy, there were only 5 per cent as many pieces rejected as was usual with the older tools. That is a very significant point, namely, that in machining to close tolerances the longer the life of the tool the less will be the machine scrap, because the more nearly the piece will be machined to a dimension within the tolerances.

When reaming a malleable iron differential carrier with 3¾-in. hole, it is cut at 70 ft. a minute with 1/64-in. cut and hand fed. With the old tools there were one or two adjustments per day, and with cemented tungsten carbide one tool has been running for eleven weeks without change.

A high-silicon alloy of aluminum, useful for gas engine pistons, can be machined only with the greatest difficulty with the ordinary tools; after about ten pistons the tools are too dull for use. With the new tools some of the operations will run 300 to 500 between grinds, and on other operations as many as 2500. Over three years ago Doctor Hoyt brought one of his new tools to Cleveland where we had been trying to machine pistons of somewhat similar composition to this with the ordinary tools and had given it up. The cemented tungsten-carbide tool proved so satisfactory that we waited for a couple of years before putting this type of alloy on the market, waiting, that is, for a commercial supply of satisfactory tools with which to finish it.

Another example (not a machine tool but a nozzle for a sand blast): The performance, compared with the chilled iron nozzle, is on the ratio of 120 to 1.

I could go on naming such examples for some time, but the order of results already quoted is now obtainable with existing tools and machine tool equipment.

There are some other features in connection with these results which have not been mentioned. In nearly every case, without change of labor, the production of the entire plant has been increased by carbide tools. It is seldom that the improvement is not 15 per cent, and sometimes the actual production has been more than doubled.

Tools for Intermittent or Jump Cuts

The art of making tungsten-carbide tools to stand up better under intermittent cuts is improving daily. Whereas a few months ago an attempt to use cemented tungsten carbide on a certain job resulted in failure, today some of those same jobs yield to the improved art. There may be some improvement in the material itself, but that is secondary as compared with the improvement in the mounting. It has been found that this material with relatively low tensile strength as compared with high-speed steel has a higher compressive strength, and it is essential to utilize the material in compression, and to develop as much rigidity in the whole tool mounting as possible. Those improvements represented mostly increase in rigidity, obtained by increasing the size of the shank, by increasing the size of the piece of cemented tungsten carbide itself, and by so mounting the piece in the shank as to receive a maximum of support in portions which ordinarily would be in tension in the tool.

This matter of rigidity has been carried to the extreme in a type of tool where the cemented tungsten-carbide insert is surrounded and reinforced on all sides (where it would normally be in tension) in a plain steel shank. Such a tool is capable of performing intermittent cuts and otherwise behaves much like one would expect of a very rugged tool.

Published literature and experience emphasize that the angles of these tools are very important. The top side rake angle is usually four degrees less than for high-speed steel for the same job, and also the side and front angles should be relatively low, usually between four and six degrees. The tool should also be set very near to center in order to reduce the tensile stresses, and to reduce chattering as far as possible.

Rapid Developments in the Art

Fifteen months ago one tool was sold to a large manufacturer in the United States, and that tool is still working. In the meantime it has replaced 2450 lb. of the type of tool material which was being used previously. That is the record so far.

But broadly speaking, about one year ago the whole country became conscious that there was such a material as cemented tungsten carbide. Naturally, the machine tool builders had to make some tests of their own to warrant expenditures for machines to develop the properties of cemented tungsten carbide.

To the keener observer, one who is familiar with the horsepower of motors which have been mounted on machine tools in the past, the machine tool congress now in session in Cleveland suggests quite a revolution. We have some records of performance of carbide tools on machines which have been designed to utilize fully the inherent characteristics of the material. One of the workers in that field asserts that the true results will probably not be believed by a good share of the readers.

When cemented tungsten carbide was given a good deal of publicity about a year ago, there was a clamor for tools, and for months the imported material and the material made in this country were not sufficient in quantity, or could not be made into tools rapidly enough, to fill this

demand. The first orders were naturally trial orders, and no great amount of business came from any one source. The expense of trying to serve that sort of a demand, of course, was tremendous, and also it put quite a tax on the organizations. But since the middle of this summer the companies promoting this material have been in a position to supply tools and tool bits on short delivery for most of the ordinary tool requirements. There are a number of desired tools which it has not been found practical or expedient to make at the present time, such as very large-sized dies for drawing tubing, but that demand will be taken care of in the not distant future.

The advent of high-speed steel was a great thing, not only for the steel industry, but for all industry; it was a great thing for mankind. It has played a major role in what we might call our economic civilization, and it has done perhaps more than any other one development in the last 25 years to help make men economically independent, to help make the expenditure of a given amount of human energy produce more of the necessities and luxuries of life.

Its advent, however, did not reduce the amount of carbon steel tools used. There are apparently being made every year more carbon steel tools than were made in the year 1905, the year when high-speed steel began to get into production. In the same way we don't anticipate that cemented tungsten carbide, even though it be sold very much more cheaply than it is today, will eliminate high-speed steel or carbon steel tools. I strongly suspect that in 1935 there will be as much or more high-speed steel made per year as in 1929, and this is a big year.

Furthermore, we do not regard this material as a cure-all for everything in the tool industry. Some applications have met with very indifferent success; some attempted applications can be branded at the present time as absolute failures. We do not know where this material will lead us, especially from the standpoint of tool substitutions. It seem, however, that we have gone far enough so that we can definitely say that cemented tungsten carbide or its approximate equivalent is destined not only to have a definite place in the future of industry, but a most important place. That it will be used in large quantities and for a great variety of purposes in the future there can be no question.

One of the results is going to be to carry the economies initiated by high-speed steel and stellite toward greater economic benefits for mankind. It seems reasonable to expect that the material can increase the average production in machine shops by 20 per cent, or will make possible the production in five days what now takes six. If that is true it cannot help but benefit all of the people, because machined goods will cost less, and it will benefit the metal industries because more metal can be used.

Treatment with Chemicals Improves Metal-Sprayed Surfaces

PROBLEMS pertaining to metal spraying were discussed by a group of interested persons meeting in Brussels early in the year, according to the Swiss *Welding Journal*. Zinc spraying is now strongly competing with galvanizing. Thriving plants spraying up to 60 tons of metal per week exist in Holland, Belgium, France and England. Whereas hot galvanizing practice tends toward minimizing the thickness of the zinc coat, spraying puts on from 0.10 to 0.18 lb. per sq. ft.

Rapid formation of a protective skin of zinc oxide on a sprayed coating is of great importance. Treating with sodium chloride speeds up the formation of this layer and produces zinc coatings which resist the action of sea water and air extraordinarily well.

Since, in the metal spraying process, a liquefied metal wire is atomized into fine particles by a compressed air jet, it is not to be expected that the deposited metal will form a homogeneous mass. Even if the particles should hit the surface in a completely liquid state, instead of in a plastic state, it would not only be impossible to hold the molten metal together on account of the compressed air jet, but the liquid metal would flow down vertical surfaces during the application. The alternative is to fill the sprayed coatings by chemical or mechanical means. Nature performs this task for zinc; oxide and carbonate are formed which close up all pores of the coated layer. This natural protective layer either does not occur or is insufficient in coatings of other metals such as aluminum, tin, copper and lead. Painting with all sorts of preparations has been unsatisfactory, as they were too easily dissolved or worn off.

Far better results are had when the metal layer is treated with certain chemicals which react with the metal. Durable aluminum coatings are produced, for instance, by treating the layer with acids and carbonates. Containers for breweries, sugar refineries and laundries have been so treated and have stood up well in service.

Spraying with aluminum as a protection against high temperature has given divergent results. One German plant preheats the steel to a red heat before spraying with aluminum; a French concern heats the object after coating with aluminum and after a treatment with borax and soda to about 930 deg. Fahr. In England aluminum coatings are applied to iron or steel specially alloyed for this purpose.

Spraying with tin has also given more satisfactory results when subsequent chemical treatments have been applied. Tin coatings treated with acids and silicates are very satisfactory for food and oil containers and for vessels and machines used in oleomargarine manufacture, baking ovens and cooking utensils. In Belgium tank cars for shipping acids have been sprayed with lead inside and zinc outside.

Larger Stock Lines Require Larger Charges

It is a matter of common knowledge that, in a pile of unsized material, the larger pieces roll to the outside due to their greater inertia. This is not the whole explanation of size segregation in the blast furnace. The difference in the angles of repose of ore and coke is an important item in stock distribution with respect to size. Observations made by the North Central Experiment Station of the United States Bureau of Mines, in cooperation with the University of Minnesota, Minneapolis, indicate that the angles of repose of ore and coke in the blast furnace are about 34 and 27.5 deg., respectively.

Calculations based upon these angles indicate that the ore layer is about one ft. thicker at the walls than at the center. Unless the size of the ore charge is increased, the effect of larger stock lines will be to decrease the amount of ore thrown toward the center of the furnace. In order to prevent an unnecessary increase in the porosity of the center of the furnace the size of the charge should be increased in about the same proportion as the stock line area.

can machine parts which heretofore could not be shaped economically with any known tool. Just where that will lead in the future no one really knows.

The material is also used to saw rock, replacing saw teeth of other material, so that, outside of the machine tool industry itself, cemented tungsten carbide has potentially a wide application.

A saw with insert teeth, 16 in. diameter, when cutting artificial lumber made of magnesia, asbestos and wood shavings, could be increased in speed from 900 to 1600 r.p.m. The steel saw cut 80 ft. of board between grinds and cemented tungsten carbide 1520; these figures represent a 78 per cent increase in speed, and 1800 per cent increase in footage between grinds.

Ivory is turned at 6000 ft. a minute, hand feed, with only a skin cut, but the result is about the same as that obtained with the diamond tool.

Extraordinary Production on Metal Work

Let me give a few examples of tool replacement when cutting metal. It should be obvious that machines designed to use tools with different physical properties might not be able to take full advantage of this new material. Nevertheless it is interesting to see what performance one actually gets.

For example, when turning armatures, one armature per grind with the best steel tool. With cemented tungsten carbide we get 40 armatures per grind; the speed is 700 ft. a minute, and 1/64-in. cut. In rough and finished turning on commutators, the old record was 150 commutators per grind; with cemented tungsten carbide, 30,000 per grind.

In a cut-off tool, the old performance was 100 cuts per grind; with cemented tungsten carbide, 15,000 per grind.

For an example of profiling 1020 S. A. E. steel at very high speed, take the old practice of 60 pieces between grinds and compare with cemented tungsten carbide, 25,000 pieces.

When boring a main transmission bearing in cast iron, 4½-in. diameter, 100 to 125 pieces could be produced per grind with the old tools; 950 with cemented tungsten carbide.

An interesting thing developed when finish boring bronze bushings to a tolerance of 0.0005 in. The old record with existing tools was 150 pieces per grind, and 7000 with carbide. In addition to this economy, there were only 5 per cent as many pieces rejected as was usual with the older tools. That is a very significant point, namely, that in machining to close tolerances the longer the life of the tool the less will be the machine scrap, because the more nearly the piece will be machined to a dimension within the tolerances.

When reaming a malleable iron differential carrier with 3¾-in. hole, it is cut at 70 ft. a minute with 1/64-in. cut and hand fed. With the old tools there were one or two adjustments per day, and with cemented tungsten carbide one tool has been running for eleven weeks without change.

A high-silicon alloy of aluminum, useful for gas engine pistons, can be machined only with the greatest difficulty with the ordinary tools; after about ten pistons the tools are too dull for use. With the new tools some of the operations will run 300 to 500 between grinds, and on other operations as many as 2500. Over three years ago Doctor Hoyt brought one of his new tools to Cleveland where we had been trying to machine pistons of somewhat similar composition to this with the ordinary tools and had given it up. The cemented tungsten-carbide tool proved so satisfactory that we waited for a couple of years before putting this type of alloy on the market, waiting, that is, for a commercial supply of satisfactory tools with which to finish it.

Another example (not a machine tool but a nozzle for a sand blast): The performance, compared with the chilled iron nozzle, is on the ratio of 120 to 1.

I could go on naming such examples for some time, but the order of results already quoted is now obtainable with existing tools and machine tool equipment.

There are some other features in connection with these results which have not been mentioned. In nearly every case, without change of labor, the production of the entire plant has been increased by carbide tools. It is seldom that the improvement is not 15 per cent, and sometimes the actual production has been more than doubled.

Tools for Intermittent or Jump Cuts

The art of making tungsten-carbide tools to stand up better under intermittent cuts is improving daily. Whereas a few months ago an attempt to use cemented tungsten carbide on a certain job resulted in failure, today some of those same jobs yield to the improved art. There may be some improvement in the material itself, but that is secondary as compared with the improvement in the mounting. It has been found that this material with relatively low tensile strength as compared with high-speed steel has a higher compressive strength, and it is essential to utilize the material in compression, and to develop as much rigidity in the whole tool mounting as possible. Those improvements represented mostly increase in rigidity, obtained by increasing the size of the shank, by increasing the size of the piece of cemented tungsten carbide itself, and by so mounting the piece in the shank as to receive a maximum of support in portions which ordinarily would be in tension in the tool.

This matter of rigidity has been carried to the extreme in a type of tool where the cemented tungsten-carbide insert is surrounded and reinforced on all sides (where it would normally be in tension) in a plain steel shank. Such a tool is capable of performing intermittent cuts and otherwise behaves much like one would expect of a very rugged tool.

Published literature and experience emphasize that the angles of these tools are very important. The top side rake angle is usually four degrees less than for high-speed steel for the same job, and also the side and front angles should be relatively low, usually between four and six degrees. The tool should also be set very near to center in order to reduce the tensile stresses, and to reduce chattering as far as possible.

Rapid Developments in the Art

Fifteen months ago one tool was sold to a large manufacturer in the United States, and that tool is still working. In the meantime it has replaced 2450 lb. of the type of tool material which was being used previously. That is the record so far.

But broadly speaking, about one year ago the whole country became conscious that there was such a material as cemented tungsten carbide. Naturally, the machine tool builders had to make some tests of their own to warrant expenditures for machines to develop the properties of cemented tungsten carbide.

To the keener observer, one who is familiar with the horsepower of motors which have been mounted on machine tools in the past, the machine tool congress now in session in Cleveland suggests quite a revolution. We have some records of performance of carbide tools on machines which have been designed to utilize fully the inherent characteristics of the material. One of the workers in that field asserts that the true results will probably not be believed by a good share of the readers.

When cemented tungsten carbide was given a good deal of publicity about a year ago, there was a clamor for tools, and for months the imported material and the material made in this country were not sufficient in quantity, or could not be made into tools rapidly enough, to fill this

demand. The first orders were naturally trial orders, and no great amount of business came from any one source. The expense of trying to serve that sort of a demand, of course, was tremendous, and also it put quite a tax on the organizations. But since the middle of this summer the companies promoting this material have been in a position to supply tools and tool bits on short delivery for most of the ordinary tool requirements. There are a number of desired tools which it has not been found practical or expedient to make at the present time, such as very large-sized dies for drawing tubing, but that demand will be taken care of in the not distant future.

The advent of high-speed steel was a great thing, not only for the steel industry, but for all industry; it was a great thing for mankind. It has played a major role in what we might call our economic civilization, and it has done perhaps more than any other one development in the last 25 years to help make men economically independent, to help make the expenditure of a given amount of human energy produce more of the necessities and luxuries of life.

Its advent, however, did not reduce the amount of carbon steel tools used. There are apparently being made every year more carbon steel tools than were made in the year 1905, the year when high-speed steel began to get into production. In the same way we don't anticipate that cemented tungsten carbide, even though it be sold very much more cheaply than it is today, will eliminate high-speed steel or carbon steel tools. I strongly suspect that in 1935 there will be as much or more high-speed steel made per year as in 1929, and this is a big year.

Furthermore, we do not regard this material as a cure-all for everything in the tool industry. Some applications have met with very indifferent success; some attempted applications can be branded at the present time as absolute failures. We do not know where this material will lead us, especially from the standpoint of tool substitutions. It seem, however, that we have gone far enough so that we can definitely say that cemented tungsten carbide or its approximate equivalent is destined not only to have a definite place in the future of industry, but a most important place. That it will be used in large quantities and for a great variety of purposes in the future there can be no question.

One of the results is going to be to carry the economies initiated by high-speed steel and stellite toward greater economic benefits for mankind. It seems reasonable to expect that the material can increase the average production in machine shops by 20 per cent, or will make possible the production in five days what now takes six. If that is true it cannot help but benefit all of the people, because machined goods will cost less, and it will benefit the metal industries because more metal can be used.

Treatment with Chemicals Improves Metal-Sprayed Surfaces

PROBLEMS pertaining to metal spraying were discussed by a group of interested persons meeting in Brussels early in the year, according to the Swiss *Welding Journal*. Zinc spraying is now strongly competing with galvanizing. Thriving plants spraying up to 60 tons of metal per week exist in Holland, Belgium, France and England. Whereas hot galvanizing practice tends toward minimizing the thickness of the zinc coat, spraying puts on from 0.10 to 0.18 lb. per sq. ft.

Rapid formation of a protective skin of zinc oxide on a sprayed coating is of great importance. Treating with sodium chloride speeds up the formation of this layer and produces zinc coatings which resist the action of sea water and air extraordinarily well.

Since, in the metal spraying process, a liquefied metal wire is atomized into fine particles by a compressed air jet, it is not to be expected that the deposited metal will form a homogeneous mass. Even if the particles should hit the surface in a completely liquid state, instead of in a plastic state, it would not only be impossible to hold the molten metal together on account of the compressed air jet, but the liquid metal would flow down vertical surfaces during the application. The alternative is to fill the sprayed coatings by chemical or mechanical means. Nature performs this task for zinc; oxide and carbonate are formed which close up all pores of the coated layer. This natural protective layer either does not occur or is insufficient in coatings of other metals such as aluminum, tin, copper and lead. Painting with all sorts of preparations has been unsatisfactory, as they were too easily dissolved or worn off.

Far better results are had when the metal layer is treated with certain chemicals which react with the metal. Durable aluminum coatings are produced, for instance, by treating the layer with acids and carbonates. Containers for breweries, sugar refineries and laundries have been so treated and have stood up well in service.

Spraying with aluminum as a protection against high temperature has given divergent results. One German plant preheats the steel to a red heat before spraying with aluminum; a French concern heats the object after coating with aluminum and after a treatment with borax and soda to about 930 deg. Fahr. In England aluminum coatings are applied to iron or steel specially alloyed for this purpose.

Spraying with tin has also given more satisfactory results when subsequent chemical treatments have been applied. Tin coatings treated with acids and silicates are very satisfactory for food and oil containers and for vessels and machines used in oleomargarine manufacture, baking ovens and cooking utensils. In Belgium tank cars for shipping acids have been sprayed with lead inside and zinc outside.

Larger Stock Lines Require Larger Charges

It is a matter of common knowledge that, in a pile of unsized material, the larger pieces roll to the outside due to their greater inertia. This is not the whole explanation of size segregation in the blast furnace. The difference in the angles of repose of ore and coke is an important item in stock distribution with respect to size. Observations made by the North Central Experiment Station of the United States Bureau of Mines, in cooperation with the University of Minnesota, Minneapolis, indicate that the angles of repose of ore and coke in the blast furnace are about 34 and 27.5 deg., respectively.

Calculations based upon these angles indicate that the ore layer is about one ft. thicker at the walls than at the center. Unless the size of the ore charge is increased, the effect of larger stock lines will be to decrease the amount of ore thrown toward the center of the furnace. In order to prevent an unnecessary increase in the porosity of the center of the furnace the size of the charge should be increased in about the same proportion as the stock line area.

No Serious Depression in Sight

Consumption Has Not Exceeded Country's Income and Productive Capacity Has Been Free from Undue Strain—Capital Created No Faster Than Savings

BY DR. CHARLES O. HARDY

DURING the past month one item of news has completely overshadowed every other element in the business situation. Developments which would ordinarily have been regarded as omens of fairer business weather, such as increases of dividends, foreshadowings of tax reduction and declines in money rates, have been interpreted as stock market propaganda rather than as business indexes. On the other hand, unfavorable news, such as declines in car loadings, in prices of basic raw materials and in the level of activity of the steel, automobile and building industries, all have been interpreted in their bearing on the future of the stock market, and on general business activity through the stock market channel of influence.

In view of this concentration of interest it may be worthwhile to recall the relationship of the fluctuations of stock prices and of business activity during the period since the completion of the debacle of 1921. During this eight-year period the trend, both of business and of the stock market, has been more strongly upward than in any previous period of our history. This fact is the more remarkable because the period has been one of very great economic strain for all the other leading nations of the world. Pre-war experience pointed to the conclusion that the prosperity of the leading commercial and industrial nations was interdependent to a much greater extent than appears to have been the case during recent years.

This upward movement of business activity in the United States has been accompanied by a similar upward trend in the level of stock prices, but the relationship of the year-to-year fluctuations of stock prices and of business activity has been less uniform. In 1922 both curves moved strongly upward; both turned down in the latter part of 1923 and in early 1924; then they turned still more sharply upward in the fall of the latter year and through 1925.

¶ Real values are not made in the stock market; they are only registered there.

¶ Prosperity is not made or unmade by errors and correction of errors in the registration.

¶ The pace of business in the last two years has not exceeded country's capacity to produce without overstraining its resources or to consume without overdraft on its income.

¶ Nor has the country been creating capital above its capacity to finance through the current rate of saving.

¶ Decline in business appears to conform to three-year cycle.

¶ A reaction like that of 1927 would not be a catastrophe.

Stock Prices Diverge from Business Trend

But in 1926 the movement of stock prices diverged from that of business. A sharp break in stock prices in the spring was more than made up by the end of the year, whereas productive activity and business profits broke all records. In 1927 the curves again diverged. Most business indexes registered lower levels than in 1926 or in 1925, profits were unsatisfactory, and the unemployment situation occasioned more concern than in any year since 1921. Stock prices, on the other hand, moved upward with only minor reactions through the year.

Stock Market Boom Out of Line With Corporate Income

Since 1927 the two series have coincided in direction, but not in slope. The business world has once more enjoyed prosperity. In the spring and early summer of 1929 signs of overproduction appeared in some basic lines, but prices did not reflect inflation. This upswing in business, however, was completely overshadowed by the Wall Street boom. Ever since the summer of 1927 the upward surge of stock prices has been out of all proportion to the increases of corporate income, though the latter have been impressive.

In general it may be said that from 1921 to the summer of 1926 stock prices went up roughly in proportion to the improvement in the actual income of the corporations whose shares were traded in; for the next year the increase of stock prices reflected an increase of dividends rather than of earnings, while for the last two years the upswing of stock prices has represented chiefly a willingness to capitalize industrial earnings at lower and lower rates. By the spring of 1928 the average of a long list of good corporate stocks were selling on a basis which capitalized their dividends at a lower rate than the bonds of companies of similar standing—a phenomenon never seen before.

Suddenness of Crash Due to Lack of "Short" Interest

The decline of the last few weeks has been unparalleled in its suddenness, though not in its extent. The suddenness of the smash may plausibly be explained by the lack of a "short" element. It has long been a commonplace of speculative markets that in a panic the first buyers are those who have already sold at higher prices, and that this sort of buying provides a cushion to break the force of the panic. Price declines which terminate real estate booms are sharper and of shorter duration than stock market liquidations because there are no short sales of real estate. Apparently in the stock market boom of 1929 the persistent upward course of prices in the face of adverse money conditions, official disfavor and the dictates of common sense had substantially driven the short seller out of the field.

Probable reactions of the stock market crisis on economic life are just now being painted in the blackest colors. "Christmas trade will be hard hit, automobile sales for several months will be cut to the minimum, luxury trades will go to pieces, building is already on the downswing, the only ray of light is the hope that stock

prices will resume their upward course." It would be rash indeed to predict that none of these things will materialize. Undoubtedly the effect of the boom is to make thousands of people poorer and to make thousands of others think themselves poorer, and trade will be affected. Nevertheless, it seems safe to surmise that this picture of the situation is overtinged with Wall Street psychology. Real values are not made in the market place; they are only registered there, and prosperity is not made or unmade by errors and corrections of errors in the registration. The losses which the country has suffered on account of the stock market collapse are not comparable with those which it suffered on account of the Mississippi flood or the Southeastern hurricane. The storm and the flood took wealth away from individuals and destroyed it, they did not transfer it to others.

Nevertheless, a stock market collapse does in the short run have some depressing effect on business. It was pointed out in these columns a month ago that a collapse in stock values must result in some improvement in bond values (which would facilitate some types of business and impede others), but that such an improvement can be expected only with a time lag. Precisely the same thing applies to the effect on individual buying power. Those speculators, big and small, who have been wiped out by the collapse of paper values at once go out of the market as buyers of luxuries; those who profit by the fall of prices are not likely to expand their purchases immediately by a corresponding amount. It takes time to show who are the gainers. The purchasers of stocks even at the bottom prices of the recent declines are not yet sure whether they have shown foresight or rashness by refusing to wait still longer.

Business Outlook Not Alarming

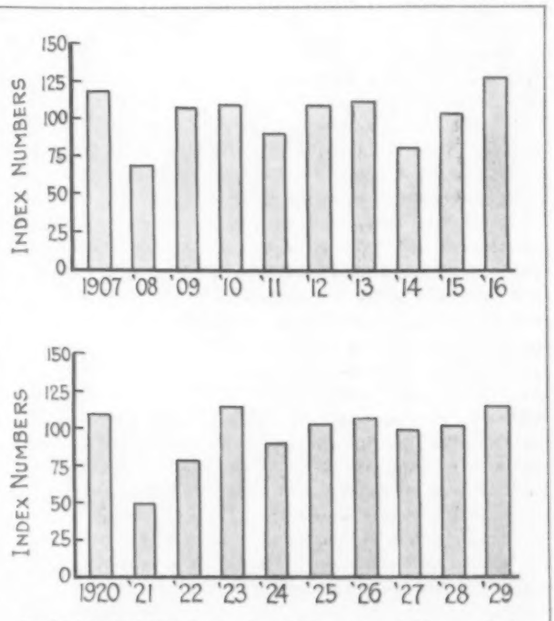
Developments outside the stock market must be regarded as mildly unfavorable, but not alarming. The money market has eased, partly because of the liquidation of stock market obligations, but chiefly because the Federal Reserve System has pumped a large amount of credit into the market in the hopes of allaying the panic. The rediscount rate has been lowered twice at New York and once at London. However, the long continued efforts of the Federal Reserve System to drive capital out of the stock market were of so little avail as to inspire skepticism regarding their probable success in pumping it in again. Industry and trade need new money no worse than they did a month or two ago.

Money rate cuts, dividend increases, bankers' pools, assurances of public officials and prominent business men that "business is fundamentally sound," public announcements that X, Y, and Z are buying stocks, widely advertised supporting orders under the market—all these are part of a propaganda designed to check or stop the downward sweep of stock prices. Such efforts are commendable in so far as they aim to prevent the bottom from dropping out of the market so fast that banks and other lenders cannot protect their loans and customers of brokerage houses cannot get information as to what their holdings are actually worth. They are commendable too in so far as they tend to check the depressing psychological effect of the stock situation on business planning. But in so far as they rest on the assumption that the country is wealthier or in any sense better off with the common stocks of its corporations valued at 30 times earnings, than when valued at 10 times earnings, they are discreditable to the wisdom of the community.

Three-Year Cycle at Work?

Outside the security market the situation is readily summarized. The moderate downward trend noted a month ago continues, and it looks as though 1930 is to fall below the records of 1928 and 1929. There is little evidence that the decline of production in basic lines has been accelerated by the doings in Wall Street, but it has not been checked. Prices of raw materials are weakening, and there is evidence of a slight curtailment of retail demand. Automobiles and building are the weakest spots; the automobile situation will probably be made worse by the stock market's collapse and building, better.

This decline raises the question whether we have developed a normal cycle of two good years and one poor one. Such a cycle appeared in late pre-war years, and since we got out of the war and the post-war boom it seems to have reappeared. The years from 1921 to 1927



THREE-YEAR Cycle of Two Good Years, Followed by One Bad Year, as Illustrated by Pig Iron Production (Index for 1929 Based on Nine Months' Performance)

repeated the sequence of one very bad year followed at three-year intervals by two moderately bad ones, which was established in 1908, 1911, and 1914. The accompanying chart shows how this cycle has appeared in pig iron production; numerous other indexes could be used to show a similar sequence. It is a temptation for the forecaster to predict that such a cycle will continue until it is again interrupted by an unpredictable cataclysm. But this is hypothetical. Perhaps the sequence of two good years and one poor one has a rational basis in the technique of our productive process—and perhaps it is merely a coincidence.

In any case there is no reason as yet to forecast a serious business depression. The pace of business in the last two years has not exceeded the country's capacity to produce without overstraining its resources or to consume without overdraft on its income. Neither has the country been creating capital above its capacity to finance through its current rate of saving. Should we have in 1930 such a recession as occurred in 1927, or even in 1924, it would not be a catastrophe. Most of our industries can earn reasonable profits if two years out of three are good, provided the third is no worse than have been the poorest years since 1921. There is no more reason why such moderate reactions should lead to downward revisions in the value of permanent investments than that mild booms, like those of 1923, 1926 and 1929, should cause those values to be revised upward.

Progressive Conveyor Assembly

Durant Cars Advance without Their Own Wheels Until Nearly Complete—More Rapid Work Gives Production Economies

PRODUCTION economies are provided in an automobile body manufacturing plant recently placed in operation by Durant Motors, Inc., Lansing, Mich. This, adjoining the car assembly department, occupies a new two-story building, the outstanding features of which are good ventilation and the excellent lighting provided by an abundance of continuous window surface.

Bodies are assembled on a conveyor on the first floor and cleaned and painted on the second floor. The wooden frame members made in a Louisville, Ky., mill, are shipped into the plant ready for assembly. This cuts down transportation charges on lumber, a considerable percentage of which becomes scrap in the making of body members.

The body assembly conveyor is approximately 400 ft. long. Near the loading end is a jig in which the sub-assemblies are put together, forming the frame. On removal from the jig, the frame is placed on a truck on which it remains through all the assembly and cleaning and painting operations, until the completed body is ready to be mounted on the chassis. Then the truck returns to the loading end of the body assembly conveyor. Each truck is mounted on four wheels, two running on a flat rail track and two on a channel track.

The wooden sections of the body are fastened together as the frame moves along the conveyor. Drills and screw drivers used in this work are electrically driven, power for these tools being taken from a trolley line directly above the conveyor. The trolley through which the current is supplied to the tools slides along on the trolley wire, permitting moving the tool along the assembly line.

When the frame leaves the jig and goes on the assembly line, the floor boards are the only wooden members that are not in place. The sheet steel panels are put on as the bodies move along the lower part of the line, after the frame assembly. Polishing on the metal sections is done along the line with air-operated polishing wheels.

Assembled bodies on leaving the line are pushed sideways on to an automatic hoist, which carries them to the cleaning and painting department on the floor above. The hoisting requires only one man, who trips the mechanism and pulls truck and body from hoist to upper floor.

Bodies Move Along Three Lines

There are three parallel conveyor lines in the cleaning and painting department. First the body is cleaned with gasoline in a spray booth, then cleaned by hand and wiped and, finally, any spots that may be left are cleaned off with emery paper mounted on wheels. Then the bodies are dried for about 20 min. at a temperature of 250 deg. Fahr.

After drying they are given a priming coat of paint. Then they move to the second conveyor line and through an oven, where the priming coat is baked. File marks and other metal spots are then removed, after which two surface coats are applied. These are dried in an oven in the third line, after which the bodies are rubbed with fine sandpaper. A clean-up operation follows and then the lacquer is applied.

The enameling department is conveniently arranged for cleaning and enameling various parts. There are two Crescent machines for cleaning parts before enameling; one is for small chassis parts and the other for hoods, fenders and aprons. Parts are first washed in an alkali solution, after which they are rinsed in water at near boiling temperature. Then they are dried in an oven at a temperature of approximately 400 deg. Fahr.

On leaving the oven the parts are moved along on a table for various hand cleaning operations. These include sanding to remove rough spots, scratches, etc., cleaning with high-test gasoline, removal, by means of air blowers, of any moisture that may be remaining, wiping inside and out and finally wiping with alcohol. Then they go to the adjoining enameling department, where they are again wiped, this time with tack rags.

There are two enameling ovens, side by side, one electrically heated and the other gas heated, each used for different classes of work. Each oven has thermostatic control. Parts that require the finest finish, such as fenders, aprons, hood sills and gas tank covers, go through an A-type oven. In this they are given two coats of enamel and are drained and baked after each dipping operation. The tunnel-type oven is used for small parts such as trunk racks, wheel carriers and other parts that do not require the finest finish.

Final assembly is done on two main assembly lines. The frame parts are received from the stamping plant and assembled at the side of the final assembly lines. Other parts are stored along these lines at points where they will be needed. The bodies are placed on the line through an opening from the floor above.

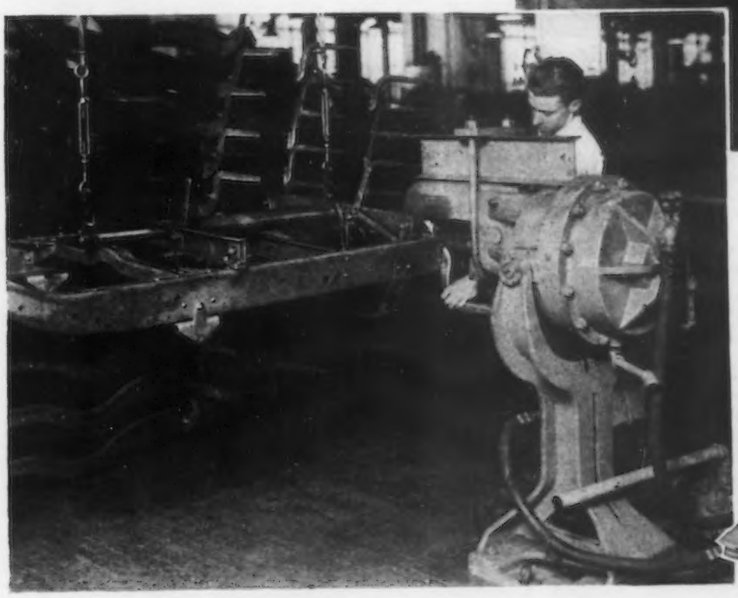
A feature of the assembling is that the wheels are not put on until the car has reached near the end of the line, and until after the body has been put on the chassis and practically all the assembly work has been done. Consequently the chassis, instead of moving on the car wheels, remains attached to the assembly conveyor until the car is about ready to leave the line. It is found that assemblers can do more rapid work in putting on various parts if the wheels are not in their way.

After the springs and axles are assembled to the chassis, the latter is turned over and set on carriers that form a part of the conveyor. Nearly all the remainder of the assembling is done while the chassis is moving on the carriers. All that remain to be assembled after the wheels are mounted are the radiators, head lamps and a few other parts, whose assembly is not interfered with by the wheels.

Each car is tested after assembling, by operating the motor with the rear wheels setting on two heavy cast iron wheels, the faces of which reach slightly above the floor level. The car is held in position by blocks in front of the front wheels and when the motor is started the cast iron wheels revolve with the rear wheels. The energy required to operate both the car in this position and the heavy wheels on which the rear wheels rest is said to be approximately the same as the energy required in a road test. The cast iron wheels are 40 in. in diameter, have an 8-in. face and weigh 850 lb. each. The shaft carrying the two wheels revolves on four groups of roller bearings, one set of bearings on each side of each wheel.

ASSEMBLING Panels and Other Metal Parts on the Body Assembly Conveyor (Right). This moves at a predetermined speed and the work is carried forward at a speed to match

FRAME Sections Are Shipped Knocked Down (Below) and Are Assembled in a Bay Adjoining the Final Assembly Lines. This picture of a riveter at work shows the frame suspended from an overhead carrier



DEPARTING from Usual Practice, Wheels Are Not Put on a Car Until Practically All the Other Parts Are Assembled (Below). Consequently, they are not in the way to interfere with other assembling work

ONE of the Machines for Washing the Parts (above). Both gasoline and boiling hot water are used in the several cleaning operations

Parts After Washing Are Given Several Hand Cleaning Operations (in circle above) Before Enameling

Fabricators Adopt Business Code

Trade Practice Conference Followed by Annual Meeting of American Institute of Steel Construction—Studies Financial Status of the Industry

FABRICATORS of structural steel held a trade practice conference Nov. 11 and 12 at the Edgewater Gulf Hotel, Edgewater Park, Miss., and adopted provisionally, under the chairmanship of Hon. W. E. Humphrey, of the Federal Trade Commission, a code of trade practice. All of the large fabricators, save the largest of them all, were present, and opinion expressed in the succeeding few days was unanimous that the industry in this meeting had taken a long step forward and one which would prove a matter of growing importance as time goes on.

In these following days was held the annual convention of the American Institute of Steel Construction, Inc. The sessions of this body, the seventh annual, were marked, in contrast with previous meetings, by an aggressive rather than a defensive attitude toward the problems of the industry. Reports of the officers were impressive, both with respect to the expansion of the organization in numbers and in activities and with respect to the research work in progress and planned, including the technical side as well as that of markets. There were intimations that the institute could put to good use for hastening research projects an income substantially equal to its present one, or roughly $300,000 a year additional.

Annual Meeting of Steel Constructors

AN outstanding address was made by Alexander Wall of the Robert Morris Associates, Lansdowne, Pa., emphasizing the importance of any one company's determining its true position, financially (and inferentially industrially), in comparison with the industry as a whole. So well received was this address (which is reported in another column), that a committee was ordered appointed to cooperate with Mr. Wall for the further development of the subject.

An inspiring contribution was made by Dr. D. B. Steinman, consulting engineer, New York, who traced with the aid of lantern photographs "fifty years of progress in bridge engineering." He detailed in somewhat popular language the tremendous strides that have been made in the length of span and carrying capacity, particularly in recent years, and also in making utility and beauty more or less synonymous. His views included designs for longer structures than now exist, such as the proposed Liberty Bridge across the Narrows at New York.

One session of the convention was given over to construction matters, with the so-called battledeck floor as a main item. Among other topics were welding, riveting and fireproofing. A demonstration of the steel deck floor featured the conclusion of the session. In a yard at the rear of the hotel a simple frame of steel, supplied from the New Orleans warehouse of the Lukens Steel Co., had been erected to show how the plates of the floor may be arc welded to each other and to the underlying beam. The exhibit also covered the easy application of molded gypsum fireproofing material, made by the Rockwood Corporation of America, St. Louis, for column protection and ceiling construction.

Among papers and addresses of the convention were these: "Industrial Cooperation," by Hon. W. E. Humphrey, Federal Trade Commission, "International Cooperation," by Hon. Vincent Massey, Minister from Canada to Washington, "Woman's Influence on Steel Purchases," by Mrs. Christine Frederick, director, Applecroft Home Experiment Station, Greenlawn, L. I. (these three at the banquet), "Steel Dams, Lock Gates, Caissons, Etc.," by Henry Goldmark, consulting engineer, New York, and an address on the geographical distribution of capacity and bookings of the fabricated steel industry, by L. Seth Schnitman of the Bureau of the Census, Washington. From Tuesday evening, following the trade practice conference of Monday and Tuesday, until late Friday night, when a hilarious get-together dinner, in a hallowe'en atmosphere, was concluded, the attendance of some 290, including ladies, was well occupied with scheduled sessions, allowing only Thursday for a golf tournament.

Growth of Steel Construction Institute

	1924	1929
Income	$30,000	$324,000
Members	114	220
Paid employees	4	50
Office rental, monthly	$225	$1,050
Literature mailed, pieces daily	....	100
Standard handbooks, daily	....	100*
Items of literature on hand for active distribution	....	108
Calls by district engineers, daily	....	45
Mailing list, arch., engr., contrs., etc.	....	3,500
Addresses by representatives	few	70
Sales manual bulletins	....	65
Technical service bulletins, monthly	....	2
Advertising inquiries, daily	....	15

*$55,000 in 18 months.

Officers Were Reelected

The directors whose terms were expiring with the meeting were returned for another three years, and the directors subsequently reelected the officers, as tabulated in another column. Also elsewhere will be found the report of the committee on mill relations. The discussion in this connection included the expression of a wish that the producers of shapes had an organization or that there could be a group of them who could be met by the fabricators in future negotiations, instead of a group approach in each case, as it now is, with a given mill.

Some time was spent in discussing a practice recently established apparently of having one contract, in Federal aid road projects, cover the bridge work as well as the foundations and road work proper. Efforts are to be made, largely through the engineering department of the institute, to reinstate the former separation of the bridge contract from the rest of the work. The investigation is likely to cover also any practice there may be of holding the steel structure of a Federal building project as part of one general contract.

Reports were submitted in printed form, as follows:

Code of Standard Practice, by C. M. Denise, McClintic-Marshall Co., Pittsburgh, chairman.

Fireproofing as Related to Structural

Steel, by E. W. Krueger, Worden-Allen Co., Milwaukee, chairman.

Uniform Method of Cost Accounting, by W. S. Mosher, Mosher Steel & Machinery Co., Dallas, Tex., chairman.

Publicity and Advertising, by George E. J. Pistor, Hay Foundry & Iron Works, New York, chairman.

Standard Handbook, by D. H. Wood, Converse Bridge & Steel Co., Chattanooga, Tenn., chairman.

Artistic Bridge Designs, by Clyde MacCornack, Phoenix Bridge Co., Phoenixville, Pa., chairman.

Wind Bracing and Technical Research, by Aubrey Weymouth.

Committee for Making Complaints

IN another column are enumerated the practices defined as unfair and practices to be condemned, all as compiled by the trade practice conference held prior to the meeting of the American Institute of Steel Construction and independently of it. The conference also voted the appointment of a committee to draft standard proposal and contract forms and it set up a committee on trade practices. This committee is "empowered to investigate and determine whether these resolutions are being observed, to make complaints concerning alleged violations, to cooperate with the Federal Trade Commission, and generally to perform such other acts as may be reasonably necessary and proper to put these resolutions into effect and accomplish the objects and purposes of this conference. The American Institute of Steel Construction, Inc., is empowered by this conference to appoint said committee."

Against Much Change in Anti-Trust Laws

Federal Trade Commissioner Humphrey, at the banquet of the institute, touched on his views respecting repealing or materially amending the anti-trust laws. He believes it best for American business to rely on an ever continuing series of decisions of the Supreme Court, or as he put it, "at last, after the lapse of forty years, lawyers and courts are able to give with reasonable certainty the law applicable to any given state of facts. Is it advisable to again travel this long and burdensome road of discouragement, confusion and business disturbance?

"The Supreme Court by precedent after precedent slowly but steadily and wisely is telling us what they [Sherman law, Federal Trade Commission act, Clayton act] mean. To now adopt a series of new statutes would cast doubt upon the applicability of this long line of judicial decisions. It would again bring upon the business of the country the legislative and judicial chaos from which we have so slowly and painfully emerged. In other words, to repeal or radically amend the anti-trust laws in my opinion would be to largely destroy all we have gained in forty years of experience."

Composite Balance Sheet for a Given Industry

THE burden of Mr. Wall's address was that a bank needs to have more information of a company than shown on the balance sheet; that this is insufficient at times even if the volume of sales and the percentage of profit are available. It is essential, he asserted, to have a composite statement of each industry and then the individual company's statement may be compared with the composite. Such a comparison is valuable not alone to the bank but to the company. Cases are known in which a given company, in the opinion of accountants, appeared to have a favorable ratio of current assets to current liabilities but its position in respect to other items, such as receivables, payables, and the like, was bound to spell receivership, unless discovered and corrected in time.

Mr. Wall had succeeded in getting statements of 54 steel fabricating concerns and presented to the meeting a compilation of the so-called common size statement, reproduced elsewhere in this report. By comparing a given company's showing with this standard for the same year, he would be able to suggest where the company is strong and where it is weak and also could indicate measures which should be taken for improvement. The common size statement, it will be noted, shows for every $100 of assets how much is cash and how much is receivables, etc.

"If we find," said Mr. Wall, "that it is usual in a particular industry for the sales to run to an amount six times the inventory and we find a single unit in that industry whose sales are only four times its inventory, we can be pretty sure that something is out of line in the processes of that single company, in connection with its inventory. It is carrying more merchandise on its books, per dollar of sale, than are its competitors, and it is an expensive matter to carry merchandise in greater quantity than is economically necessary because of the carrying charges."

After the session adjourned, THE IRON AGE asked Mr. Wall for figures which would show roughly where the fabricating industry stands in relation to a number of other industries. A few of the ratios are here tabulated:

Structural Steel Industry Compared with Other Industries

Industries	Current Assets to Current Liabilities	Net Worth to Fixed Assets
Fabricated steel	270	150
Passenger automobiles	340	400
Motor trucks	500	400
Wholesale heavy hardware	340	255
Hardware manufacture	370	625
Machine tools	250	370

The Robert Morris Associates, represented by Mr. Wall, is an association of the credit officers of banks. It was organized in 1915. It has accumulated statements numbering between 7000 and 8000, covering 70 different branches of industry, and it compiles statements of each business

Structural Steel Fabricators

Common Size Statement
As of about Dec. 31, 1928
Composite of 54 Names

ASSETS	
Cash	5.21
Receivable	21.73
Merchandise	22.26
Marketable securities	3.44
Miscellaneous	0.03
Total current	52.67
Total fixed	47.33
Total	100.00
LIABILITIES	
Payables	18.53
Taxes	0.69
Miscellaneous	1.14
Total current	20.36
Funded debt	4.03
Total debt	24.39
Reserves, bad debts, etc.	1.94
Net worth	73.67
Total	100.00
Percentage in Relation to Total Assets	
No. reporting sales	24
Sales	127.42
No. reporting profits	18
No. reporting losses	4
Net profit and loss, per cent	6.07
Selected Ratios	
Current	270
Worth-fixed	150
Worth-debt	310
Sales-rec.	625
Sales-mdse.	640
Sales-fixed	265
Sales-worth	170
Profits on net worth, per cent	7.0
Profits on sales, per cent	4.0

American Institute of Steel Construction, Inc.

OFFICERS

President, Charles N. Fitts, New England Structural Co., Boston.

First vice-president, C. M. Denise, McClintic-Marshall Co., Pittsburgh.

Second vice-president, Clyde MacCornack, Phoenix Bridge Co., Phoenixville, Pa.

Treasurer, George E. J. Pistor, Hay Foundry & Iron Works, New York.

Executive director, Charles F. Abbott.

Chief engineer, Lee H. Miller.

DIRECTORS

*H. B. Hirsh, Belmont Iron Works, Philadelphia.

George E. J. Pistor, Hay Foundry & Iron Works, New York.

J. L. Kimbrough, Indiana Bridge Co., Muncie, Ind.

*L. L. Gadd, Levering & Garrigues Co., New York.

C. M. Denise, McClintic-Marshall Co., Pittsburgh.

W. M. Wood, Mississippi Valley Structural Steel Co., Decatur, Ill.

A. J. Dyer, Nashville Bridge Co., Nashville, Tenn.

*Charles N. Fitts, New England Structural Co., Boston.

Karl E. Vogel, Omaha Steel Works, Omaha.

G. E. Klingelhofer, Pittsburgh Bridge & Iron Works, Pittsburgh.

Reese Llewellyn, Consolidated Steel Corporation, Los Angeles.

*N. W. Warren, Dominion Bridge Co., Ltd., Montreal.

*W. S. Mosher, Mosher Steel & Machinery Co., Dallas, Tex.

*H. A. Fitch, Kansas City Structural Steel Co., Kansas City, Kan.

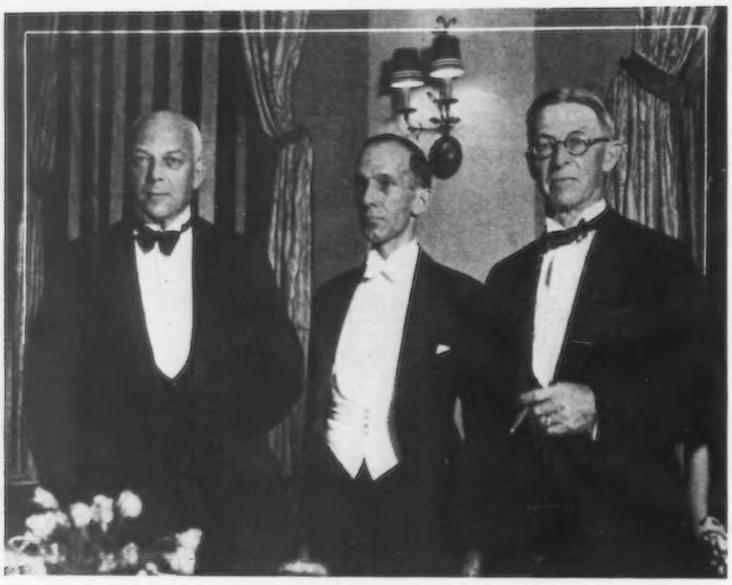
J. J. Duffin, Duffin Iron Co., Chicago.

Clyde MacCornack, Phoenix Bridge Co., Phoenixville, Pa.

James T. Whitehead, Whitehead & Kales Co., Detroit.

J. E. Miller, Bellefontaine Bridge & Steel Co., Bellefontaine, Ohio.

*Re-elected for another term.



AT the banquet of the American Institute of Steel Construction the chief speaker was Hon. Vincent Massey, minister from Canada to Washington. From left to right: N. W. Warren, Dominion Bridge Co., Ltd., Montreal; Mr. Massey and Charles N. Fitts, president of the institute.

under the various ratios for each year. Statements are submitted to the association on a standard form. The plan serves, he emphasized, to give individual banks the courage and the basis to help clients, through the opportunity to compare a client's status with the composite of his industry. As suggested, from the industrial standpoint, it is calculated to save a company from slipping into a dislocated situation with respect to others in the same industry.

Recommends Several Association Activities

IN his address as president, Charles N. Fitts made some recommendations which were enumerated in THE IRON AGE of Nov. 14, page 1327. Elaborating on them the subjoined extracts give the basis of his suggestions:

The effect of taxation and government revenue in cities and localities where height restrictions are imposed by legislation, the cost of housing in localities where buildings are allowed to take full advantage of construction economies, the question of congestion, (whether the skyscraper is a *cause* or a *result*) are problems that should be analyzed by experts and "the American Institute of Steel Construction is the proper body to initiate the investigation."

The demolition of structures will undoubtedly afford the best of opportunities for discovering the effects of time on the various materials. "To make adequate diagnoses of demolished buildings we would have to enter into an investigation of the condition of all the various materials which entered the structure originally.

Trade Practice Conference on Structural Steel

THE trade practice conference of the structural steel industry, held Nov. 11 and 12, defined the industry to include "any person, firm or corporation herinafter designated the distributer, engaged in manufacturing, selling, distributing or erecting structural steel for construction purposes." Its further definitions were:

A distributer is a mill, a warehouse, a fabricator or an erector, or any or all of them.

For the purpose of these proceedings a mill is a manufacturer of structural materials for construction purposes, which sells to a warehouse or fabricator.

A warehouse is a concern that carries a well selected stock of plain materials, buys in suitable quantities and re-sells to fabricators, erectors and others and assumes the credit risks and such other obligations as are common to such sales.

A fabricator is a concern that maintains a shop for the fabrication of plain materials for construction purposes and assumes the credit risk and such other obligations as are common to such sales.

An erector is one that generally contracts with buyers to furnish and erect structural steel fabricated by himself or others and assumes the credit risk and such other obligations as are common to such sales.

Unfair Practices Enumerated

The resolutions passed by the conference, later to be acted upon by the Federal Trade Commission and segregated into its groups 1 and 2, defined the following as unfair practices:

GROUP 1

To use or to substitute materials inferior in quality to those specified or required by the applicable governmental regulations.

In manufacture and erection, to use methods not in accord with governmental regulations obtaining.

The sale of material below cost to injure a competitor or with the effect of lessening competition.

For steel distributers to sell below cost or beyond usual marketing territory, with the effect of lessening competition. (Dumping.)

The secret payment or allowance or acceptance of rebates, commissions, credits, discounts, or like concessions, in money or other valuable thing, or any secret understandings or agreements to do work or to furnish material on terms other than those set forth in the contract between the parties. (Commercial Bribery.)

Dissemination of information, false or misleading, relative to competitors' products, selling prices, credit standing, ability to perform work, or labor conditions. (Defamation of Character.)

Knowingly to submit a bid after a contract has been awarded to a distributer.

Any discrimination in price between purchasers, whether subsidiaries of the manufacturers or otherwise, in violation of the Clayton Act.

Practices Condemned

As group 2 the following practices are condemned:

To recognize uneconomic or an unsafe structural design. In the matter of regulations of manufacture and erection, in territories where no governmental laws, rules, or regulators as to manufacture and erection of buildings prevail, the conference voted that the standard specifications and code of standard practice of the American Institute of Steel Construction, Inc., shall be used.

When lump sum bidding is impracticable, figuring the final weight in any other way than the accepted practice of the industry as set forth in the standard specifications and code of standard practice of the institute, unless otherwise specifically set forth in the invitation to bidders, is condemned.

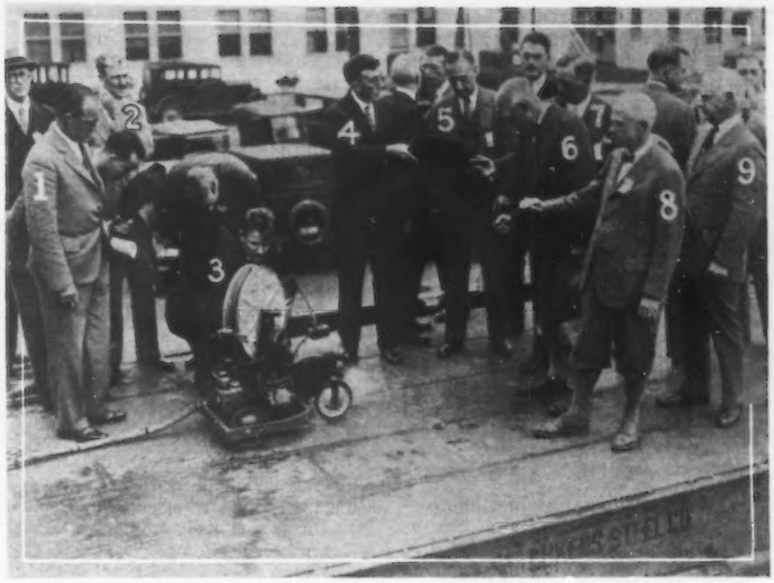
Misleading promises of delivery and performance that cannot reasonably be fulfilled.

To submit a bid without having been requested or invited to do so.

To condone reopened bidding, commonly known as "shopping."

THE battledeck floor being pushed by the American Institute of Steel Construction leaves space underneath for carrying piping, with molded fire-proofing, such as gypsum, to enclose the conduits and form the ceiling. The self-propelling electric arc-welding machine, taking the welding rod from a coil mounted on the machine, welds together the edges of two plates and the plates to the supporting beam.

Among those witnessing the welding performance are: (1) C. T. McLoughlin, General Electric Co.; (2) James N. Keenan, engineer at New York for the institute; (3) J. E. Waugh and (4) D. H. Deyoe, welding engineers of the General Electric Co.; (5) F. H. Frankland, technical service department of the institute; (6) Charles N. Fitts, New England Construction Co., president of the institute; (7) Lee H. Miller, chief engineer; (8) George E. J. Pistor, Hay Foundry & Iron Works, New York, treasurer; (9) W. M. Wood, Mississippi Valley Structural Steel Co., Decatur, Ill., a director. According to Chief Engineer Miller, the steel plate flooring structure "will reduce the dead floor load by about one-half and make it possible to add 25 or 30 per cent more stories without increasing foundation loads."



An investigation would disclose answers to some of the economic problems which are constantly presented us in the erection of structures.

"The work if done properly embraces much more than an examination of the structural steel. It covers more facts than would be sought by any one industry. The Bureau of Standards should be empowered to direct the work if not actually to make the investigations for us."

By promotional efforts frequently displayed by local chambers of commerce in their endeavors to extend the industrial importance of their various cities, businesses are invited to construct new plants and to engage in a manufacturing activity in localities that are sometimes more than adequately supplied. "There should exist some adequate means to check such unwarranted enthusiasm."

The collection and dissemination of the necessary statistics "is distinctly the province of the United States

Report on Mill Relations With Steel Constructors

FOLLOWING are the main items of the report of the committee on mill relations of the American Institute of Steel Construction, presented by H. A. Fitch, Kansas City Structural Steel Co., chairman:

The activities of your committee have, during the past year, been confined to the question of financial support on the part of the rolling mills to the institute's program. The treasurer's report shows that the amounts received from the mills during the fiscal year ended Sept. 30 was approximately the same as was contributed during the previous year. This result is, of course, not equal to our hopes or expectations.

We respect the opinion and conclusions of the officials of the various mills, with whom we have conferred during the year. Our interpretation of the attitude of the mills is that they intend to continue and augment their support as the conditions and facts pertaining to our proposed activities may warrant.

Our interests and our problems are so closely related to the interests and problems of the mills—where these problems pertain to structural steel—that almost we are partners. The ultimate attainments hoped for, whether specific or general, are identical.

Let us remember that we may not always know the facts in the case. Business is complex—our organizations are large and extended—the structural steel business is not conducted by fixed rules and instructions. Every transaction has its own complexion. The members of our own organization, who must of necessity be given discretionary powers, do not always reflect our interpretation or judgment in a transaction.

The types of buildings being erected today are not the types that will be common ten years from today. There is going to be a revolution in the types of building construction. These future buildings certainly will be of steel frame. Can this industry sit calmly by and allow other interests, often unfriendly interests, to guide the trend of building development? We must come to a realization that we are builders as well as fabricators, and we must assume the responsibility attendant thereto.

We must know more about structural design, and floor design, and fireproofing, than any other one agency. We must approach this from a scientific and impartial viewpoint. We must obtain and appropriate the necessary funds to develop the scientific facts in a conclusive manner. We must, of necessity, do this collectively. No individual concern is qualified to do this. The work and the results must be done in such a manner as to inspire confidence by the public.

The American Institute of Steel Construction has assumed the responsibility and is sponsor for the structural steel industry. The mills have recognized that the institute is the logical agency for this development, and have confidence in the competency of our organization. As we plan our constructive program and determine our requirements, we have every confidence of the cooperation of the mills to the fullest extent.

Government. We have no means of knowing what the shop capacity is within well defined trading zones, nor has there been established any uniform basis for measuring that capacity. Neither do we know how active the business is in competitive areas. These defects could be easily remedied to the great benefit of the structural steel industry.

"The officials of the Bureau of the Census have shown a decided willingness to accommodate us to the full extent of their ability. In return I recommend that we individually and collectively assist the Bureau of the Census in the compilation of their studies by complying fully with all their requests for information and data."

Semi-Centennial of the Skyscraper

"The American skyscraper has certainly left a deep impress in the industrial, commercial and social life of this country, and is synonymous with American business supremacy. It has been an agency of greatest importance to the structural steel industry, so much so, in fact, that we should be the sponsors and the leaders in a proper celebration of its inception.

"Possibly no better means could be devised than an engineering and architectural exhibit to be held in Chicago in 1934 coincident with an international conference on skyscraper building."

Mr. Fitts, at the outset of his address, expressed satisfaction that while a recession in the sale of steel in general began in August, bookings of structural steel continued to gain. The fact, he said, means that "we have begun at last to demonstrate the true merits of structural steel. Our cooperative campaign is at last convincing those responsible for important structures that if strength and security are to be achieved this material must be specified."

Expansion of the Institute

THE report of Charles F. Abbott, executive director of the institute, whose headquarters are 200 Madison Avenue, New York, was presented in the form of a 70-page illustrated pamphlet. It was a convincing document on the notable expansion made by the association in its short period of existence. Elsewhere are enumerated some items illustrative of the institute's development.

In addition it appears that 217 cities have adopted in whole or in substance the standard specification making for economies in design, that wider use is now made of the institute's code of standard practice, that numerous foreign countries have commended favorably the standard handbook. The institute now has eleven district engineers, one having been added to the staff, with headquarters in Dallas. Mr. Abbott asks for five more for a needed reallocation of districts. He describes how sales representatives of member companies have been drafted into the service of the national organization. The institute's bureau of engineering service, advertising and advertising returns, the use of the standard sign on buildings in course of erection, and educational literature came in for special consideration.

The steel plate floor construction, which Mr. Abbott mentions as demonstrating the possibilities of applied research, offers according to estimates a potential market that would consume plates to a greater tonnage than that going for railroad cars and shipbuilding combined. The use of steel in dam construction, he adds, is another undeveloped opportunity awaiting a similar effort. Considerable work has already been accomplished and the possibilities have been well charted. Much also has been accomplished in establishing the merits of steel in hangar construction in connection with the development of airports.

Needs of the Institute

From the last section of Mr. Abbott's report the following has been taken:

The institute should engage in a more extended activity—additional field engineers, more enlarged advertising and other extensions are advisable in order that the present momentum may be fully sustained. It should not be handicapped when its record entitles it to enlarged support. It should grow with the demands being made upon it for service. It should not be forced into a position incapable of meeting a natural growth. The present organization should be kept together, which is possible only when ambition can become satisfied with future prospects.

The individual concern, no matter how large, has found itself totally unable to cope with the new struggle for markets. The forces that can be marshalled against it are too great. The battle line is too far flung. The ability to understand that the individual concern can prosper only as

Distribution of Fabricated Steel Capacity and Bookings in 1928

THE accompanying tables were presented to the Steel Constructors' meeting by L. Seth Schnitman, United States Bureau of the Census. In 1909, he said, fabricators with monthly plant capacity of 2500 tons or over had 65 per cent of the total capacity of the industry; in 1925, 58 per cent; in 1929, 60 per cent. Plants with capacities of 500 to 2499 tons represented in 1909, 25 per cent of the total capacity, in 1925 and 1929, 32 per cent. Plants with capacities of less than 500 tons have only once since 1909 reached a ratio of 11 per cent, in 1923; it now stands at its lowest point of the entire period, at about 8 per cent. Fifty-one per cent of the number of structural plants have capacities of 500 tons or more and together these firms have 92 per cent of the entire capacity of the industry.

The Western division has for its Eastern boundary the north and south line of States of New Mexico to Montana. The Southwestern comprises Texas, Oklahoma, Arkansas and Louisiana. The Southern lies east of the Mississippi and south of the Ohio.

Distribution in Each Section by Size of Plant

	Under 500 Tons		500-2499 Tons		2500 Tons and Over	
	Capacity	Bookings	Capacity	Bookings	Capacity	Bookings
New England	17.2	13.0	82.8	87.0	...	...
Middle Atlantic	3.9	3.6	15.0	13.8	81.1	82.5
Southern	3.9	3.2	39.7	33.0	56.4	63.8
Midwestern	15.2	14.2	40.4	40.5	44.4	45.3
Southwestern	12.6	18.3	87.4	81.7	...	...
Western	15.3	15.2	57.7	51.6	27.0	33.2
Total	8.7	8.3	31.2	28.7	60.1	63.0

Distribution in Each Group of Plant Sizes

	Under 500 Tons		500-2499 Tons		2500 Tons and Over	
	Capacity	Bookings	Capacity	Bookings	Capacity	Bookings
New England	5.4	4.4	7.3	8.1	...	...
Middle Atlantic	21.6	23.1	23.3	24.3	65.0	66.4
Southern	4.1	3.2	11.5	9.3	8.6	8.2
Midwestern	56.6	57.1	42.3	45.5	24.0	23.2
Southwestern	3.1	4.1	6.0	5.1	...	...
Western	9.2	8.1	9.6	7.7	2.4	2.2
Total	100.0	100.0	100.0	100.0	100.0	100.0

Geographical

	Capacity	Bookings	Ratio of Bookings to Capacity, Per Cent
New England	2.8	2.7	70.0
Middle Atlantic	48.3	50.7	74.5
Southern	9.2	8.2	63.0
Midwestern	32.4	32.3	70.0
Southwestern	2.1	1.8	60.0
Western	5.2	4.3	58.0
	100.0	100.0	

the industry prospers offers the sole hope of survival.

The institute has the support of all elements of the industry, the approbation of the public, the confidence of the architect, the engineer, the contractor and the public official.

Discussion on Welding and Riveting

IN the session devoted to construction matters, progress in electric welding was discussed by Dr. F. P. McKibben, of the General Electric Co., and J. C. Lincoln, president, Lincoln Electric Co., Cleveland. Dr. McKibben exhibited lantern photographs showing details of the work done on the General Electric building in West Philadelphia, the Chalfonte Hotel at Atlantic City and a General Electric building at Pittsfield, Mass. He said that 58 towns and cities now allow structural welding. He opposed a present move to require licensing of welders, partly on the ground that it leaves workmen more or less under the undue supervision of municipal boards. Some 40,000,000 lb. of steel are welded annually, he added. His lantern slides also included some automatic welding of steel pipe 48 in. in diameter for a 7-mile line.

Mr. Lincoln devoted himself in large part in speaking for the carbon arc as against the metallic arc. He also showed machine welding; this applied to a 60-mile line of 66-in. pipe of ⅜-in. and ⅝-in. steel for Oakland, Cal. He regarded his machine as well adapted for erecting the steel deck floor. He placed considerable emphasis on the use of welding as being the best single method of promoting an increased use of steel.

R. W. Boggs, Union Carbide Co., New York, touched briefly on the gas welding of a building for the company at Niagara Falls, N. Y., described at the time of its completion in THE IRON AGE.

What A. F. Jensen, president Hanna Engineering Works, Chicago, had to say on riveting is reviewed elsewhere in this issue.

What Is Happening in Structural Riveting

Speed With Easy Handling—Portable Yoke Riveters, Alloy Rivets and Cold Riveting Likely

BY A. F. JENSEN*

A CONSUMPTION of more than 35 million rivets per month conveys some idea of the rivet's important place in the structural steel industry. The first yoke riveters, built about 1865, were steam actuated, the hydraulic riveter following in 1873. A patent covering a pneumatic riveting hammer was issued two years later, to be followed by the plain toggle yoke riveter in 1877 and by the toggle lever pneumatic yoke riveter in 1903.

Today we see portable pneumatic riveters driving 700 ¾-in. rivets an hour in small columns and giant portable pneumatic riveters weighing 30 tons driving 1¼-in. rivets, 6¾ in. long, in hydroelectric penstocks and spiral shells at rate of 60 an hour. The challenge of ever increasing boiler pressures has been met by stationary hydraulic riveters exerting 275 tons on the rivet.

The industries joining lighter thicknesses of metal reflect similar progress. An automatic line, producing 360 automobile chassis frames per hour, drives approximately 700,000 rivets a day. The efficiency of the riveting process also finds a place in our infant industry—aviation. The gastight sheathing of the all-metal dirigible ZMC-2 contains about 3½ million rivets which were driven at the rate of 5000 an hour.

Next Advances in Riveting

We may look forward to the introduction of portable yoke riveters (much lighter than machines now in use), alloy steel rivets and acceptance of cold riveting. Standardization of design and the constant increase in the volume of fabricated steel may justify power-actuated mechanical devices for the manipulation of riveters on straight run work whereby the bucker-up is eliminated and the operator controls two or more riveters merely by the manipulation of valves, making it possible for a crew of four men to drive at least 50 rivets a minute and the introduction of multiple riveting machines which will drive at least a dozen rivets for each operation cycle.

Structural shop methods of the past have been superseded by an exactness almost equal to that of the machine shop. The quality of the riveted joint is better than that of a decade or two ago and with the development of spacing tables, gang punches, riveters, etc., labor costs have been constantly reduced. It is still more economical to rivet the major part of our structural steel tonnage.

The five-story welded steel building erected at Sharon, Pa., by the American Bridge Co. for the Westinghouse company cost $5,800 in excess of the amount a riveted structure of similar design would have cost. The increased cost per ton of this welded structure over the riveted seems to be confirmed by the price of the 12-story Homestead Hotel addition erected at Hot Springs, Va., by the American Bridge Co. It was contracted for at $8 a ton in excess of what would have been bid for a riveted structure. Actual costs left them with a heavy investment in the welded structure.

The use of the pneumatic riveting hammer has created a clamor for the elimination of the noise prior to the development of sufficient evidence that it can be done. Perhaps Dr. Donald A. Laird, director, psychological laboratory, Colgate University, has forecast what may be the accepted procedure in structures of the future. Dr. Laird says: "Build a room with sound-proof walls and enough sound will come through the keyhole and reflect back and forth upon those walls to create a din. What modern buildings need is something upon those walls to absorb sound. Then people can leave the windows open even if riveters are working across the avenue."

There is a field of usefulness for both welding and riveting and we believe the advancement of both processes lies not in competition but in their supplementing each other. We cite a few examples:

Combined Use of Riveting and Welding

Six-mile pipe line for Springfield, Mass., water supply. Longitudinal seams were welded, girth joints field riveted.

Tube segments for the Detroit-Windsor vehicular tunnel. Longitudinal joints were welded, circumferential joints riveted and calk-welded.

The Mokelumne water supply project serving Oakland, Cal. Longitudinal seams were welded, circumferential joints field riveted.

An extension to the power house of the Haddon Hall and Chalfonte Hotels, Atlantic City, N. J. Columns were shop welded, beams and girders shop riveted, field connections bolted and welded.

Addition to the Ohio Valley General Hospital, Wheeling, W. Va. The shop fabrication was riveted, field connections bolted and welded.

Welding will replace riveting only when proved more economical, less dependent on skilled labor and assuring equal safety.

The American Society of Mechanical Engineers has set itself to the task of reviewing the present state of knowledge of riveted joints together with an extensively abstracted bibliography on the subject. This is a commendable undertaking and will be of material assistance in determining the lines along which research should be conducted.

Driving Special Head Rivets Cold

The forming of the head requires the greatest part of the pressure necessary to drive a rivet. In the construction of gas holders, where rivets as large as 3 in. in diameter are being driven cold, a flat driven head is accepted; holes are filled, there is no distortion and there is a saving in rivet stock. A comparison of pressures necessary to drive rivets (structural quality) cold with both standard button head and special head is here tabulated.

Tonnage to Drive Rivets

Rivet Diam., In.	Button Head		Special Head, Cold	Size of Special Head, In.
	Hot	Cold		
⅝	20	50	30	5/32 x 15/16
¾	30	70	40	3/16 x 1 1/8
⅞	50	100	60	7/32 x 1 5/16

*President, Hanna Engineering Works, Chicago. From an address before the American Institute of Steel Construction, Nov. 14.

Getting Open-Hearth Steel Quality

Operators Discuss Methods of Achieving Specified Characteristics—Heating and Rolling of Ingots and Blooms—Control of Slags

LAST week we carried on pages 1307 to 1310 the first portion of the discussions of the open-hearth committee meeting of the American Institute of Mining and Metallurgical Engineers. The story is continued in the paragraphs below. As in all of these sessions for several years, there were no prepared papers. The meeting took more the form of a round-table discussion and each topic was attacked by several men, representing varying practices in different plants.

Quality Control for Rimmed Steel

REPORT of one of the two Quality Control Committees was made by its chairman, J. M. Hughes, Sharon Steel Hoop Co. Quality improvement in rimmed steel was reported to be obtainable largely by controlling the evolution of gas in the steel and its escape from the ingot before solidifying. Along with this goes control of the carbon in the furnace operations. The pig iron used has a definite bearing on the subject. A hot slag of uniform composition is required, to hold the sulphur within limits.

As a result of tests extending over a year, slag analyses have shown fairly consistent results. Silica and alumina combined have fallen for the most part (79.5 per cent of the cases) between 48.1 and 49 per cent. Three-fifths of the remainder fell between 47 and 48 per cent, and the rest between 49 and 50.

Fairly Uniform Results

As to the iron content, about 1860 tests showed 43.7 per cent between 1.01 and 1.20 per cent FeO. Half of the remainder—29.6 per cent of the total—were between 1.21 and 1.35 per cent. None of the tests ran above 1.50 per cent. Sulphur showed more than half of the total tests between 0.021 and 0.030 per cent, this range accounting for 57.4 per cent of all. Another 38.4 per cent ran from 0.031 to 0.040 per cent sulphur, while the remainder were outside these limits.

Low iron oxide content in the steel represents good quality in the steel. An analysis was given for averages for 317 successive heats, ranging between 0.07 and 0.13 per cent carbon content, with the following results in the slag: 12.26 per cent silica; 17.34 per cent FeO; 5.01 per cent Fe_2O_3; 44.21 per cent lime and 9.07 per cent MnO. Of these heats about two-fifths represented 0.10 per cent carbon. The remainder were above and below this limit, with only 26 of the total below 0.09 per cent and the same number above 0.11 per cent.

Operating Requirements

Furnace bottoms must be kept in good shape if trouble is to be avoided. The charging rate of scrap in tons an hour has a bearing. The metal in the ladle may be profitably treated with some super-deoxidizer. Tapping temperatures should be about 2850 deg. Fahr.

With a 1¾-in. nozzle an ordinary heat should be teemed in about 45 min. If the nozzle is 1½ in., about 10 min. longer will be required. If the heat is charged into the soaking pits within 70 min. after the first ingot is stripped, the steel should remain in the pits about 2 hr. 15 min.

In discussing this report, Dr. C. H. Herty, Jr., of the United States Bureau of Mines, expressed the opinion that we can make as clean steel with 22 per cent FeO in the slag as with 16 per cent, if the steel has been properly deoxidized.

Quality in Killed Steel

KILLED steel was reported upon by William C. Kitto, Pittsburgh Steel Co., chairman of the committee on that subject. It was stated that pig iron is wanted with silicon between 0.90 and 1.25 per cent. This iron is wanted hot and from as smoothly working a blast furnace as possible.

The particular furnaces reported on have capacities from 140 to 250 tons, with bath depths from 26 to 36 in. It is customary in these cases to add one half of the ferromanaganese in the furnace and the remainder in the ladle, when making steel for tin bar. For all other heats, all of the ferromanganese is added in the ladle. These heats are poured into molds measuring 16 x 38 in. and 22 x 24 in.

For high-carbon seamless tubing with 0.35 to 0.50 per cent carbon, and for bars and billets having from 0.40 to 0.75 per cent carbon, in 93-ton heats, it was reported desirable to melt so that about 5000 lb. of molten iron can be added one hour before tapping. These heats are made with 12.5 per cent limestone additions. In this case both ferromanganese and ferrosilicon are added in the ladle, the pouring temperature being such that a skull of 1000 to 1500 lb. is left in the ladle. This steel is teemed slowly for the first 6 in. of the ingot and again for the top 12 in.

Avoiding Too Hot a Furnace

Discussing the reports on steel quality one company reported working the furnace on the cool side for rimming steel until almost at the desired tapping carbon; then the temperature is raised and the heat is stirred with rods. The air supply is shut off a few minutes before tapping, for two reasons: One is to relieve the pressure on the surface and thus facilitate removal of the oxides from the bath; the other is to prevent thinning of the slag by too much air.

Another speaker referred to the half-inch skin on rimming ingots extending up 14 to 18 in. from the base. Above that point the ingot is likely to be practically solid.

In another plant, making killed steel of 0.55 to 0.80 per cent carbon, in 75-ton furnaces, it is customary to take out the heat in from 2 to 2½ hr. after an ore addition. This heat is tapped at the high temperature of 2950 deg. and then held for 8 or 10 min. in the ladle, during which period it drops about 100 deg. The steel is bottom poured at the rate of about 3 tons in 4 min. Ferromanganese is added in the furnace and 50 per cent ferrosilicon is added in the ladle.

Steel Melting Practice

IN the absence of Roy L. Leventry, Republic Iron & Steel Co., Youngstown, chairman of the Steel Melting Committee, the report was read by Howard McClelland, of the same company. Plants using cold stock can regulate the iron charge by proper mixing of irons of known analyses. In a hot-metal plant, however, a mixer is necessary. If the blast furnace is not running evenly, the open-hearth furnace will need an extra charge of lime or limestone and more time will be required to make the heat. Ideal conditions call for silicon of about 0.90 to 1.25 per cent and managanese 1.75 to 2 per cent.

Changing the proportion of hot

metal in the charge from 45 per cent to 70 per cent has been found to decrease the production of ingots at the rate of about 1 per cent for each 4 per cent increase in the metal charge. Correspondingly, the bottom costs on the furnace will be increasing.

Gain from Larger Heats

Increasing the charge in a furnace by 100 per cent will increase the daily output about 50 per cent, with the same working force. The most desirable depth of furnace bath was reported between 2 and 3 ft. There is less bad bottom trouble on a deep bath and good steel can be made with the depth as great as 40 in., according to this report.

Charging delays have an important bearing on tonnage; these must often be met, because of the poor general quality of scrap now obtainable, a condition which is not likely to improve. A small amount of alloy in the scrap may have a disproportionately disastrous effect on the quality of the finished bar.

Lime additions increasing from 8 to 11 per cent of the weight of the metallic charge were found to result in a loss in ingot tonnage, amounting to about 1 per cent for each ½ per cent of lime addition. Deep furnaces and, to a less extent, large furnaces of standard proportions will take less lime than will shallow or smaller furnaces. This follows from the fact that there is less surface area, in the large or deep furnace, for each ton of metal to be covered.

Characteristics of Charge and Yield

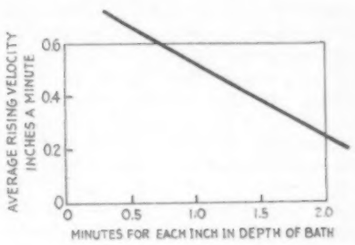
Discussing this report, one member reported that both busheling scrap and hydraulic scrap are good, but with the qualification that the latter must be from a reliable dealer and well compressed. With 118-ton furnaces his plant charged, in the first nine months of 1929, a total of 42.7 per cent of metal and 57.3 per cent scrap. This included 31 per cent hot metal, 10.1 per cent cold pigs; 1.6 per cent molds and stools, as the pig iron charge. The scrap charge was 1.6 per cent furnace and pit scrap; 31.8 per cent heavy melting scrap, No. 1 and No. 2; 16 per cent busheling scrap, 3.3 per cent hydraulic compressed scrap and 4.6 per cent bundling scrap.

On these furnaces the limestone charge was 8.9 per cent. The yield in ingots was reported as 92.5 per cent, with 0.4 per cent butts; 1.6 per cent pit scrap and 5.5 per cent loss. These furnaces are making about 7200 tons of steel each, in a month. They have averaged about 5½ min. loss to the heat, because of bottom trouble. Speed of making heats has averaged 9.85 tons an hour from tap to tap and 10.5 tons from charge to tap.

Pouring Practice

REPORT of the Pouring Practice Committee was made by its chairman, Kenneth C. McCutcheon, American Rolling Mill Co., Ashland, Ky. The report recommended the use of as shallow a ladle as possible, both to limit the hydrostatic head and consequently the force of the stream entering the mold, and to allow the impurities a chance to rise easily through the metal. Nozzles should be selected with regard to consideration of all conditions to be met. These include both the type and temperature of the steel, the size of the mold and whether pouring is to be top cast or bottom cast.

Rate of rise of steel in the mold is an important matter. It should be as slow as can be arranged, with due regard for other considerations. Tests made on 30 x 70-in. molds showed that 9 in. a minute rise gives better all-around results than either 6 in. or 15 in. There are fewer snakes and cracks



Rate of Clearing of Silicates from Open-Hearth Bath

in the surface under these conditions. Comparison of chipping costs of a ton of steel with varying rates of rise in the molds showed $3.16 average where the rise was less than 5 in.; $1.21 for a rise of 5 to 10 in.; $1.08 for a rise of 10 to 15 in., and $2.21 where the rise was 15 in. or more.

Control of the rate of rise in bottom pouring is had by the number and size of ingots in each group poured. To get a good surface on narrow slab molds, bottom pouring should be practiced whenever the molds are small.

One operating man expressed the opinion that a shallow ladle does not need a long nozzle to avoid spraying the sides of the mold in teeming. A deep ladle, on the other hand, does require a long nozzle to get away from this trouble, because of the great ferrostatic head back of the stream of steel entering the mold.

Progress on Open-Hearth Investigation

NEW methods of determining iron oxide and silicates were reported upon by Dr. C. H. Herty, United States Bureau of Mines, Pittsburgh, who has been engaged for several years in a study of open-hearth furnace reactions and changes in the slags and bath constituents, with a view to improving the quality of steel manufactured. Dr. Herty reported that under certain conditions the Dickenson method of measuring these metalloids caused incorrect results, with a residual manganese of about 0.20 per cent, unless we have also in the steel from 0.10 to 0.15 per cent of silicon.

A new method for determining the ratio of inclusions depends upon a scale on the microscope eye-piece. Particles showing up in the field of the microscope are usually readily identifiable and are practically circular in shape. The scale permits measuring the diameters, upon which the areas are computed and added up. Then, by applying the ratio of density for the inclusions to that for steel (2.3 or 2.5 to 7.8) the percentage of inclusions for cast steel may be obtained.

Method of Calculation

For iron oxide the practice is to deoxide with aluminum in the testing spoon. When this is analyzed for Al_2O_3 it may be noted that about 0.4 per cent aluminum will take care of all the FeO in the steel. Anything more than this is wasted except for a little excess so as to be sure of having enough, and to care for what may be slopped over. The remainder burns and makes a scum on the surface. The atomic weight relation between 3FeO and Al_2O_3 is 2.11. If, therefore, we multiply the amount of Al_2O_3 from analysis by 2.11 we obtain a figure which is three times the FeO in the steel.

Thus are determined the silicates on the wild sample and the iron oxide on a sample killed with aluminum. To make a silicate particle rise out of the bath it is necessary to have sizable particles. Doubling the diameter increases the speed of coming out about fourfold. The rate of cleaning of the bath for each inch of depth is proportional to the rising velocity of the particles. A characteristic curve covering this point is given at the left.

Much more rapid cleaning of the bath is obtained with ferromanganese added ahead of the ferrosilicon than with ferrosilicon alone. With shallow baths, ranging from 17 to 22 in., the time required for rising of silicates figures out at about 1.5 min. for each inch of depth, whereas with deep baths, up to 41 in., the time is 1.6 min., as found by a test, which is substantially the same rate. With the deep bath Dr. Herty thought it might be better to kill the steel in the ladle, instead of in the bath.

Agreement with this idea was expressed by one metallurgist. Another man, some of whose furnaces have about a 36-in. depth of bath, reported that these take about 10 per cent less ferromanganese to each ton of steel than similar qualities of steel made in a 24-in. bath. This applies particularly to steel having a residual of 0.25 to 0.30 per cent manganese, the quantities used being respectively 10 lb. and 11 lb. to the ton of steel made.

Less Oxidation on Deep Bath

This phenomenon was explained by Dr. Herty on the theory that the deeper bath has much less oxidation to the ton, because the area of the surface is less for each cubic foot of volume, and it is that top surface which absorbs the FeO and passes it down through a gradient toward the

bottom. Part of the bath near the bottom may be virtually inert.

One operator expressed the opinion that the open-hearth bath for economy in practice should be 30 or 36 in. deep, rather than 24 in. Dr. Herty, however, dissented from this opinion in the case of such furnaces as have the steel deoxidized in the bath.

It is common practice to add a box of lime about 30 min. before the tapping, to thicken the slag near the tapping time on killed steel. Some, however, try to keep the slag all along at such consistency that lime will not have to be added at that time.

Use of Purifiers for Iron and Steel

ALKALIES in cast irons have now reached a commercial basis, according to one of the operating men. Soda ash and limestone seem to be much alike in their results. Small amounts of soda ash are capable of increasing the chemical activity of open-hearth slags, according to this speaker. Fused soda ash is still in the experimental stage.

Considerable soda ash is used in the Aston process in making wrought iron, said Dr. Herty. This is put into the cupola before blowing and the purpose is to get the sulphur down.

Reactions of this type require a reducing condition, according to another speaker. The material would have no effect on steel in the ladle. It might make the slag in the furnace more fluid, but, according to this man's opinion, this result could be achieved otherwise more cheaply.

One operator uses a purifier on deep-drawing strip steel of characteristics similar to automobile body sheets. His practice is to use about 125 lb. in a ladle of iron from the mixer and to put 350 lb. on top of the lime in the furnace. This makes the steel pour in rather oily fashion; it rims in better and rolls better into slabs.

Manganese Vs. Aluminum as Deoxidizer

FOR rimming steel the question was discussed as to the quantity of manganese replaced by one pound of aluminum to the ton of ingots. One operator stated that the higher the manganese is the poorer will the steel rim. He said that it is necessary to cut down the aluminum addition as the manganese is increased. What is added goes into the ladle. On a sheet bar heat, with 15 lb. of aluminum in the ladle, he had a beautiful rimming action; on a heat of Armco steel, on the other hand, 100 lb. of aluminum in the ladle caused an equally beautiful rimming action.

Another operator reported making no aluminum additions on a steel of 0.08 to 0.11 per cent carbon, with the manganese 0.35 to 0.40 per cent. Still another man making 0.08 per cent carbon steel said he uses 20 lb. of aluminum in the ladle when the manganese is 0.35 per cent. It takes 30 lb. of aluminum, however, for the same rimming action when the manganese is 0.25 per cent.

He thinks that more aluminum is required to take care of gas evolution. As the manganese analysis is not known until after the steel is in the ladle, the excess quantity of aluminum is put into the molds. This same experience was reported from another plant, where no aluminum is used for rimming steel of 0.08 to 0.10 per cent carbon when the manganese is 0.45 per cent. When the manganese is 0.25 per cent, however, one ounce of aluminum to the ton of steel is put into the mold.

Proper Time for Adding Ore

SEVERAL men stated that no harm has been experienced through adding ore to the heat before the lime is all up, unless the ore is in large lumps. In this case it may kill the lime boil. A better quality of steel is customarily obtained, however, when the ore is added later than when it is put in with a high metal charge. To avoid bottom trouble, however, it was generally the opinion that it is better to get the lime all up before the ore is added.

Atomizing Oil Fuel with Superheated Steam

SUPERHEATING the steam for atomization to 700 or 800 deg. Fahr. reduces the oil consumption by about 2 gal. to the ton, compared with a low superheat, according to one operator. This high temperature, however, is bad on the valves. To offset this condition, one plant has built its own valves of Monel metal to take care of the high temperature.

Use of low-gravity oil makes it necessary to put in a water-cooled burner. A three-way valve may be used to reverse the oil. During reversal there is then no pressure in the line between the valve and the burner. There may be a momentary surge of oil accompanied by smoke as the oil lights at the other end.

In a large steel casting plant, which does not use reversing valves for this purpose, the oil is shut off at one end and then turned on at the other. There is thus no loss of oil or of heat going to the stack. Another plant reported the use of a relief valve in the pump house to keep the oil pressure uniform, while a steam manifold regulates the steam pressure.

Low-pressure oil of 46 Baumé, with a pressure of only 23 lb. at the standpipe, was said by one speaker to need a temperature of at least 175 deg. Fahr. at the burner. Trouble results if the oil temperature drops below 150 deg. Oil is heated customarily in the storage tank before it is pumped to the furnace.

One plant uses a temperature regulator with a motor-operated valve to hold the oil hot in the suction system. There is also an individual heater at each furnace, which is used to get 8 to 10 gravity oil up to 250 deg. Fahr.

Storage tanks in this case have a capacity of 3,900,000 gal. One tank of 1,500,000 gal. capacity has been cleaned out about once a year, the deposit of sludge in the bottom being about 2 ft. deep. This condition has been largely remedied through the use of an oil which is heavy enough to pick up sludge and foreign particles and float them in through the furnace, where they are burned.

Soaking Pit Heating and Chipping Costs

OVERHEATING or a long soak in an oxidizing atmosphere was reported to result in a lot of fine hair-like seams in the surface of a billet. These have to be chipped out. In the plant from which this report was made, comparison was instituted between oxidizing and reducing atmospheres in pits, the latter being found to result practically in freedom from seams.

Heating of cold ingots was suggested as resulting sometimes in a center harder than the surface and likely to produce trouble. Much difficulty was reported in one plant both from soaking pit heating and in the reheating furnaces for the finishing mills. Another man stated that considerable difficulty is experienced whenever the ingots are overheated.

Splash or mechanical trouble on one side of the mold was given as the probable cause of surface defects and pits.

Rolling Temperatures

Temperature for heating soft sheet bar steel in soaking pits was recommended variously from 2200 to 2400 deg. Fahr. Rephosphorized ingots should not have so much heat applied, according to one authority, as those which are not rephosphorized.

High-sulphur ingots, however, seem to make no difference, according to one operator, who stated that he is getting 87 per cent yield from ingots to billets containing 0.08 to 0.16 per cent sulphur, 0.05 per cent phosphorus and 0.70 per cent manganese. This man stated that when a heat melts with 0.045 to 0.05 per cent sulphur he will not use it for screw stock. He wants sulphur as low as 0.03 per cent, and then the steel is resulphurized in the ladle. Unless this precaution is adopted the steel will not roll so well.

(*To be concluded*)

Chicago Engineers Obtain Large Soviet Contract

The MacDonald Engineering Co., Chicago, has obtained from the Soviet government a $110,000,000 contract for the construction of a chain of cement plants, grain elevators, flour mills and miscellaneous industrial enterprises throughout the Soviet Union. The government will supply the capital, material and labor, while the designs of the plants will be made and the work directed and supervised by a staff of 45 American engineers.

Oxy-Acetylene Welders Review Progress

Pipe Joints, Both in Trunk Lines and in Industrial and Office Buildings, Aircraft and Steel Fabrication, Expand Materially

HEALTHY, normal growth of the industry, successful competition with competitive methods and progress in research and development work were reported at the thirtieth convention of the International Acetylene Association, held Nov. 13 to 15 at the Congress Hotel, Chicago. Statements of advancement, both technically and in application and expansion clearly indicated the progress made by the industry in the past year. No doubt exists in the mind of Bennett Chapple, vice-president, The American Rolling Mill Co., Middletown, Ohio (who delivered the keynote address), concerning the future use of steel products and the important part which welding will play in fabrication. Industry, he said, depends on having iron and steel in such forms as engineers can make use of them. Welding of thin sheets offers great possibilities, and in this connection he mentioned the fact that the automobile industry uses from 35 to 40 per cent of the output of American sheet mills. He predicted steel elevated highways, bathroom fixtures made from fabricated steel and greater use of steel in road and sidewalk construction. Programs for making rivers navigable will result in orders for thousands of steel barges. He foresees steel producers making greater efforts to promote the use of their products for many new purposes.

Pipe Line Construction More and More Important

THE report of the Oxy-Acetylene Committee pictures the progress of the industry both technically and in its numerous applications.

Among the important subjects covered is that of pipe lines for oil and gas. Oxy-acetylene welding has sometimes been carried on by owners of the lines and sometimes by contractors; the results have varied decidedly, particularly where there has been a question of speed of completion. Companies contracting to do oxy-acetylene welding must be able to assure the owners of the lines of their ability to weld at a reasonably low cost and with a large enough force.

Some means of reducing the cost of making a joint are indicated, notably by teaching welders to make a thoroughly satisfactory weld at a faster rate by using larger flames, by decreasing the angle of the vee, and by keeping the weld as narrow as consistent with good workmanship.

Unquestionably, workmanship on recent lines has been better than it was even a year or two ago. This has been due to improvement in methods of testing welds and to the introduction of higher grades of filler rods. Several large organizations have constructed their lines in accordance with the strictest procedures outlined by experienced welding engineers.

Workmanship Improved By Testing

A recent important development in test methods has been a portable testing machine for making tensile tests in the field upon specimens which have been removed from pipe lines under construction. In this way the essentials of a testing laboratory are brought directly into the field for continued sampling of workmanship on the job, where the workman can, if necessary, see the result.

A recent example of the successful use of regular check inspections to raise the standard of welding was on a 20-in. pipe line belonging to the Empire Co. In the first period of a few days, the average strength of welds selected as apparently inferior ones and cut from the line averaged between 45,000 and 50,000 lb. per sq. in. In the next period, selected apparently inferior welds ranged from 50,000 to 55,000 lb. per sq. in. The third set ran 55,000 to 60,000. New welds cut at random averaged above 60,000 lb. per sq. in., which is the minimum specification for the pipe steel; three-quarters of the joints outpulled the pipe.

This report stressed the need for standardized methods of testing and qualifying welders for specific tasks. This need has already been recognized by the American Welding Society and a committee has been appointed to prepare standard specifications for the qualification of welders. This will enable employment managers to know what to expect from welders who claim they are expert in specific fields, and will also enable training schools to keep in mind definite standards for qualification of welders before granting a certificate.

Demand for pipe welders and desire of plumbers' and steamfitters' unions that their members be trained to fabricate and weld pipe has greatly increased vocational school activities in some districts. Certain engineering schools that work closely with the industries are cooperating in manual training, including welding, and thus are extending their work in a way quite satisfactory to the welding interests.

Welding in Power Plants

While engineers are not now specifying welding to a very great extent, because they can never be sure about the welding ability of the sub-contractor, they are nevertheless allowing responsible contractors employing trained pipe welders to weld wherever it is economical, at the option of the contractor, for working steam pressures up to 250 lb. Above that pressure many engineers are still skeptical of its advisability. On the other hand, it is not uncommon for the pipe fabricating concerns to weld steam headers for pressures of 400 to 600 lb.

Aircraft Industry Uses Welding Exclusively

WELDING in this industry is now being extended from fuselage construction, where it is quite common—almost universal—to work on other parts of the structure and engine.

Re-inspection of welded steel fuselages which have been in service for six or seven years have noted that welded joints are in perfect condition; tests to destruction of some of the joints have given just as satisfactory strengths as was predicted.

The Waco Aircraft Co. has found, as reported by Russell F. Hardy, chief engineer, that highest efficiency in any welding department is obtained only through the employment of a capable and conscientious personnel, working under the most favorable conditions, with efficient equipment and first class materials.

Five papers were devoted to the subject of welding in the aircraft industry. J. B. Johnson, chief metal branch, War Department, Wright Field, Dayton, Ohio, reported on a recent inspection of a number of welded steel fuselages which were built in 1924 and which have been in practically continuous service in the United States since that date. These fuselages had been through an average number of overhauls of 2.4, and the average number of hours between overhauls was 291. The reason was usually deterioration of the fabric-covered wooden wings.

The amount of repairing on the fuselage skeletons was small and con-

sisted principally of straightening bent tubes or replacing members in the engine section which had failed due to vibration, when the original mount contained members which were too light in weight.

A representative fuselage was surveyed by cutting out the joints at the principal stations and pickling them in acid for 24 hr. The pickled joints were examined with a magnifying glass for cracks, seams, lack of bond, or other weaknesses. There was no evidence of any deterioration or fatigue cracks. The joints, as far as could be determined, were in excellent condition. Tension tests on a few of the joints corroborated the visual examination—the joints developed their rated strength.

Notable Piping Installations in Buildings

One of the greatest problems for heating and plumbing contractors is the attitude of labor toward new methods and processes, continues the Report of the Oxy-Acetylene Committee. The industry is now established for threaded and flanged work, and labor is trained along the same lines; therefore, it is obvious that a turnover to welding involves problems in both equipment and man power. So far, it appears that there will be no serious invasion of this field by welders from the outside, but rather that the steam fitters will be trained for the new work. This is logical, as the skilled steamfitter is thoroughly familiar with the problems of steam flow, water flow, drainage, friction losses and insulation requirements, and all he needs to know is the essentials of the new art in order to adapt it to his work.

Perhaps the best evidence of the possibilities of welding in this field may be obtained from a review of what has already been accomplished. During the past year or two there have been some outstanding installations of welded piping that are worthy of note. In New York, piping systems have been welded throughout the New York Central Building, in the Cathedral of St. John the Divine, in the new office building of the New York Life Insurance Co., occupying the old site of Madison Square Garden, and in several public school buildings; in Chicago, the 37-story Carbide & Carbon Building; in Detroit, the massive Fisher Building; in Cleveland, the B. F. Keith Building and the Union Terminal Building.

Machine Cutting an Essential to Fabrication

MACHINE cutting has progressed materially in the direction of mass fabrication, or as it may better be called, replacing of castings by steel elements shaped by automatic cutting machines and fabricated by welding and perhaps bending.

The subject was discussed by Otto C. Voss and G. E. Matters, of Allis-Chalmers Mfg. Co. The automatic cutting torch is now used at their plants on almost all products, including parts for crawler and wheel type tractors, bases, yokes and rotors for electric generators and motors, transformer covers and tanks, drums and operating levers for hoists, guards for steam engines, parts for cement grinding mills and kilns, and steady plates for condensers.

After the shape cutting machines had been in service a short time, considerable economies developed in using up smaller pieces of plate steel. The volume of scrap has thus been greatly reduced by using it for valve rings, flanges and similar small parts.

Fabrication based on steel plates, shapes, and roughly preforged billets simplifies purchasing, stock-keeping and storage. In Europe, cutting machines have been made with a number of fine adjustments. They may fit purposes where mass fabrication is not essential; but their cutting range is limited, and it takes much time to adjust the machines for the various shapes. In the United States, simple machines with considerable cutting range have been adapted to diversified fabrication.

A tendency to use machines with more than one torch is noted. Many machines already run with two torches, some with four; recently a machine with six blowpipes has been put in operation. This means that, after some training, one operator and helper can produce six times the work with one machine and cut up a large plate without further handling.

Structural Steel Welding Is Expanding

Welding in the fabrication of structural steel has rapidly come to be an adjunct of the riveting process, according to H. M. Priest, American Bridge Co., New York. For certain types of industrial and tier buildings it offers possibilities in reducing the weight of steel required, in the simplification of details and a more flexible adaptation of the steel to architectural requirements. Repairs or additions to existing structures can often be carried out most advantageously by employing the welding process; numerous bridges have been reinforced to carry the increased locomotive loadings.

Mr. Priest noted that it is well to consider how welding affects shop procedure. In the first place, it does away with riveting and consequently with the punching operation. However, a certain amount of punching will still be required for bolting the members together in the field. One principle of economic fabrication follows quite obviously that punching of main material should be avoided and holes be kept in the small details, since the latter can be handled much more readily and cheaply at the punches. In other words, once a saving of one or more operations becomes possible, that saving should be utilized by proper arrangement of the details. Material in the shop should be segregated and as far as possible the number of different operations to be performed on each piece should be limited. With a reduction of punching there is a corresponding decrease in template work and an increase of work of laying out directly on the steel. Whenever there is sufficient duplication to warrant the expense, it is desirable to construct jigs for locating and holding the parts in their proper relation until welded. Clamps replace bolts in assembling and some thought should be given to reducing the number required.

Hard-Facing Metals, a New Development

During the current year considerable progress has been made in the development of hard alloys and metals for wearing surfaces and in their effective applications. The usefulness of some of these materials is based on inherent hardness at room temperatures; others are hard at elevated temperatures.

Allied to this group there have been important developments during the year in materials used as diamond substitutes in oil well drilling and for machine tools. On rock drilling tools the hard metals or carbides must be applied to material of shock-resisting qualities, usually with the oxy-acetylene welding blowpipe.

These diamond substitute materials have given long life to fishtail bits, machine tools, chutes, conveyor flights and other equipment. These expensive materials must be applied in small units effectively and economically.

New Officers Elected

Officers elected for the coming year are: President, C. A. McCune, director of research, American Chain Co., Bridgeport, Conn.; vice-president, W. E. Flannery, vice-president K-G Welding & Cutting Co., Inc., New York; and A. Cressy Morrison, New York, secretary-treasurer.

Award of the Morehead medal for 1928 was made to the late Samuel Wylie Miller, for research in metallurgical and mechanical engineering phases of welding. Mr. Miller was consulting engineer for the Union Carbide & Carbon Research Laboratories, Inc., Long Island City, New York.

Sheet and Tube Company to Sell Zanesville Property

The Youngstown Sheet & Tube Co. has given an option to the Zanesville Chamber of Commerce, Zanesville, Ohio, for the purchase of its plants at that point. The company's Zanesville properties are inactive, the machinery having been dismantled and removed to Youngstown. A plan is under way to form a new company to manufacture steam shovels and road building machinery, and the Sheet & Tube company has agreed to take, as part of the purchase price, $150,000 of stock in the new company which plans to occupy the Zanesville plant.

Electric Heating and Welding

Both Steel and Non-Ferrous Metals Covered in Pittsburgh Conference—Direct "Fuel" Cost Is No Criterion

ADVANTAGES of electric heating in the manufacture of steel and iron and steel castings, as well as recent developments in the electric arc-welding of metals, were outlined at a conference on electric heating and welding held in Pittsburgh on Nov. 13 and 14, under the auspices of the Pennsylvania State College, State College, Pa., and the Association of Iron and Steel Electrical Engineers.

Among the uses of electric heat which were discussed, annealing furnaces, steel melting furnaces, salt bath furnaces and electric galvanizing tanks were emphasized. A special feature of the conference was a talk at the dinner meeting on the closing day by Lieutenant-Commander C. E. Rosendahl, United States Navy, describing his flight around the world on the Graf Zeppelin.

Welding Heavy Materials

A potential market for between 2,500,000 and 3,000,000 tons of steel a year was suggested by J. F. Lincoln, vice-president Lincoln Electric Co., Cleveland, in describing the possibility of replacing steel castings for many purposes by units built up of welded structural steel. He pointed out that the patterns for many steel castings cost more than the first casting made from the mold, thus adding considerable expense. He showed a number of slides tending to illustrate the difference in appearance between steel castings and electrically-welded units and pointed out that objection to welded articles on the ground of appearance is unwarranted.

Discussion of this paper included several inquiries regarding the method of electrically welding steel pipe used by the A. O. Smith Corporation, Milwaukee. Mr. Lincoln said that that company used steel of high tensile strength and that the entire seam is welded at once under the Smith plan.

Methods of building up metal by welding on materials which are subject to abrasion in use were emphasized in a talk on recent developments in electric arc-welding by K. L. Kansen, Northwestern Mfg. Co., Milwaukee. He explained that bits for oil well drilling are now being improved by building up metal and that this process is finding use also in repairing worn spots on steel rails.

In the non-ferrous field Mr. Hansen pointed out that considerable progress had been made recently in welding copper alloys, particularly on the rotor bars of a.c. motors. Other fields in which arc-welding is gaining ground are in stainless steel and in the fabrication of steel tanks and annealing pots.

Advantages of Electric Heating

Pointing out that the high cost of installing electric heat as compared with other fuels often prevents its adoption, Wirt Scott, special engineer, Westinghouse Electric & Mfg. Co., Mansfield, Ohio, cited a number of advantages of electric heat in actual performance. Among them were uniformity of quality, dependability of product, lower cost of rejections, decreased floor space, decreased cost of labor, elimination of rigid testing and inspection on account of confidence in product, decreased cost of labor after heat treating, saving of labor in starting up furnaces, better working conditions and consequent reduced labor turnover, less handling of materials, less accessory equipment required, reduction in accidents, reduction in fire hazard, reduced maintenance, lower scrappage of product, reduction of replacements after goods have been shipped and better shop appearance.

By attaching a monetary value to each of these items, Mr. Scott reached the conclusion that an average plant might save $986 a month by the use of electricity while the excess cost of installation over other fuels is only $180.

Outlining the use of the electric annealing furnace, James Kniveton, Ryan, Scully & Co., Philadelphia, pointed out that it should be utilized principally on items where quality is uppermost and which can stand the higher production cost. He stated that absolute control of oxidizing gases during annealing is possible with the electric furnace, and that, contrary to former belief, slight oxidation is sometimes advantageous.

Mr. Kniveton advised companies operating electric annealing furnaces to forget operating costs for a time, and concentrate on the metallurgical results obtained. The furnace is especially adapted to continuous operation and, although the cost is often higher, the superiority of the product offsets this.

It was brought out in the discussion of this paper that the increased costs could easily be added to the selling price of the finished product if the sales department were fully instructed as to methods of emphasizing to the trade this superiority in product.

Similarity of the electric melting furnace now used most commonly to the first steel-making furnaces was pointed out by Frank W. Brooks, chief engineer, William Swindell & Brothers, Pittsburgh, in a paper on electric furnaces for steel melting. Mr. Brooks outlined the growth of the electric steel-melting furnace over the last 20 years and described the four principal types in use at present—the direct arc-induction, the indirect arc-induction, the core-type induction and the coreless-type induction furnace.

He illustrated the various types by photographic slides, pointing out the principal differences. Recognizing that European electric furnace practice is often considered superior to that of this country, Mr. Brooks stated that labor in those countries is more painstaking in securing quality of product, while quantity as well as quality is considered in this country.

Discussing electric salt bath furnaces, A. E. Bellis, president, Bellis Heat Treating Co., Branford, Conn., emphasized the importance of the chemistry of the bath preparation to insure uniformity of quality. The operation of the bath is also highly important in protecting the surface of the article being treated, and the rate of heating demands considerable attention. Mr. Bellis described the operation of the salt bath at considerable length, illustrating his paper with slides showing successful installations.

Cost of Electric Galvanizing Justified

ADVANTAGES of electric galvanizing were described as self evident at the beginning of a paper on that subject by R. M. Cherry, General Electric Co., Schenectady, N. Y., but he admitted that its costs are somewhat higher than on other methods of galvanizing. The cost is accounted for largely by the cost of the heat, the zinc coating, maintenance, labor and quality.

Zinc coating makes up the largest part of this cost, but its thickness depends entirely on the temperature and accuracy of control, which can be regulated nicely. The cost of the zinc averages about $12 a ton of product, while the cost of electric power is $1 to $1.20 a ton. Maintenance and continuity of service are governed largely by the plant set-up, but the tank will last longer if it is uniformly heated.

Quality depends largely upon constancy of temperature, but the operator must be considered also and he is able to regulate the temperature

much more closely in the electric process. Mr. Cherry concluded his paper by citing a number of results of active operations.

Tool Steel Development

Owen K. Parmiter, metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., gave a general outline of the use of electricity in the development of tool steel. He said the electric furnace really made high-speed steel possible, because by its use alloys with high melting points can be melted. It also practically eliminated the human element in steel making of this sort.

Some of the advantages of electric furnace steel were enumerated as follows: Greater uniformity in chemistry, closer adherence to limits, greater purity physically, practicability of adding alloys in furnace rather than in ladle and adaptability to recovery of valuable alloy scrap. There also are a number of mechanical advantages, such as tilting for the pouring of steel and the fact that melting can be resumed at any time without long preliminary heating.

Develops New Cincinnati Cutter Grinder

SENSITIVE anti-friction table mounting, rigid bed with ample cross-sliding saddle support, and wide range are features of the new No. 2 cutter grinder recently announced by the Cincinnati Milling Machine Co., Cincinnati.

The box-type bed has three point support on the floor and contains an accessible motor compartment. The working table is of fixed height and operation is further facilitated by mounting the table on a sensitive roller bearing support—a new feature. As evidence of the effectiveness of this mounting, it is stated that, if a man of average size were to stand on the table, the movement would still be easy and free. The table slide rides on two long roller chains guided by four ball bearings, two on each end. Accurate cross-adjustment of the saddle up to 10 in. is obtainable by means of handwheel *A*, which is duplicated at the rear of the machine. The saddle is supported by two inverted Vee guides that are never exposed. The table can be swiveled and has the regular graduated swivel dial, a scale reading taper in in. per ft., also a means for fine adjustment.

Fine handwheel movement of the table, desirable for cylindrical and surface grinding, is obtained by engaging the knurled knob *B* and then turning the adjacent crank. Engagement of the knob, *B*, prevents table traverse except by means of the crank, which is an advantage when setting up a job. The knurled knob at the rear is used for ordinary cutter grinding. The table working surface measures 5¼ x 36 in. and the table movement in line with the centers is 18 in. Work 10 in. in diameter can be swung between centers. Work 27 in. long can be held between the ends of the table, while work 21 in. long can be handled between the regular head and tailstocks.

Facilities have been provided for attaching the new style tooth rests for any kind of cutter grinding, and cushioning dogs, shown at *C*, are attached to the side of the table for controlling the table movement. Alinement of tailstock and workhead is made by means of clamps and thumbscrews rather than by means of tongues that fit in the table T-slots.

The grinding wheel head is mounted on a column that can be adjusted vertically and swiveled in its bearings. Swiveling is facilitated by a lever which extends from the grinding wheel head, and column graduations from 0 to 240 deg. are provided. Vertical adjustments, up to 7½ in. maximum, are made by means of handwheel *D*, which has a dial graduated in 0.001 in. The grinding wheel spindle is driven by a special ½-hp. 3425-r.p.m. motor mounted at the lower end of the column. Motor shaft and spindle are parallel and the drive is through a straight belt. Provision is made for taking up belt stretch. A two-step cone pulley provides spindle speeds of 3850 and 5735 r.p.m. The wheel spindle is large and is mounted in anti-friction bearings. The grinding wheels are fitted on collets.

Lubrication of the wheel spindle bearings is from an oil reservoir on the back of the head. The saddle itself forms an oil reservoir in which the roller chains, upon which the table slides, are immersed. From this reservoir, wicks carry oil to the two Vee bearings. Centralized oiling is provided for the column elevating mechanism.

The workhead, which receives the shanks of end and face mills, swivels in a vertical and a horizontal plane, both having degree graduation. The company's patented clearance setting dial is employed. The spindle has the new standard taper hole on one end and a No. 12 B.&S. taper hole on the other end. Four taper collets are supplied for reducing the No. 12 B.&S. taper hole to Nos. 11, 10, 9 and 7 B.&S. taper holes.

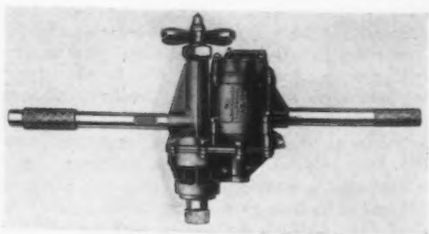
The machine is furnished as plain or universal, the latter being the plain machine plus attachments for cylindrical, surface and internal grinding and a fourth attachment for gear cutter sharpening. The workhead of the universal machine is driven by a ¼-hp. 1750-r.p.m. motor. The operating floor space required for the machines is 4 ft. 10 in. x 5 ft. 10½ in. The plain machine weighs 1600 lb. and the universal machine 1750 lb.

EASE of Operation Combined with Accuracy Are General Features of the New Cutter Grinder Shown at Left

New Pneumatic Drill

THE Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, has developed a new rotary pneumatic drill, designated as the Thor 275, which has capacity for drilling holes up to 1½ in., and for reaming holes up to 1⅛ in. Its governed free speed is 350 r.p.m. The machine will carry a 50-lb. load at the free running speed and a 100-lb. load at a speed reduction of only 30 per cent. Smooth operation is a feature emphasized.

The machine weighs 35 lb., and may



THE Pneumatic Drill at Right Has Drilling Capacity of 1½ In. and Reaming Capacity of 1⅛ In.

be handled by one man. The construction is such that it can be used close on the side without removing the dead handle. The cylinder is made of nickel cast iron to withstand rotor blade wear, and ball bearings are used throughout the tool, including the spindle and gear.

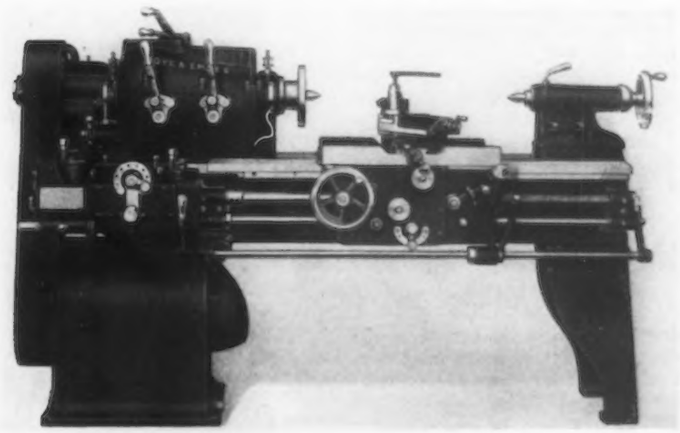
New Coneless Engine Lathes

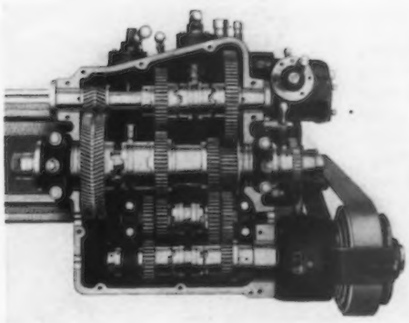
THE Boye & Emmes Machine Tool Co., Cincinnati, has placed on the market new 14 in. and 16 in. selective headstock "coneless" lathes. All gears in the headstock are constantly in mesh, and 12 spindle feeds are obtainable through 13 gears. Gears and clutches are of alloy steel, heat treated and all shafts are made of S.A.E. 3250 steel, and heat treated. The gears are of wide face and the clutches slide on shafts having multiple spline milled from the solid. Anti-friction bearings are used throughout, with the exception of the spindle, which has lapped bronze bearings, although anti-friction bearings can be furnished. The driving pulley with its multiple disk clutch is supported at each side by bearings. Thrust collars are hardened, ground and lapped.

Back gears are mounted in front of the spindle and are used for eight of the 12 speeds. Placing the back-shaft and gears in this position is intended to bring the spindle pressure down against the headstock, instead of upward on the bearing caps. This arrangement also counteracts the upward lift of the tool. The face gear and pinion are of herringbone type. The quick-change gear box furnishes 40 changes of thread leads or feeds, the changes being made instantly without binding action on the levers. By changing two gears on the quadrant odd or metric threads are cut.

All gears in the apron, which is of box section, are of alloy steel and are supported on both sides. Cross feed and longitudinal feed frictions are of the cone type and are self-adjusting. An interlocking arrangement prevents engaging of the half nuts while the feed is engaged. The entire apron is lubricated from one oil reservoir. The carriage is of heavy construction and slides on two Vee ways. It is drilled and tapped to receive the follow rest at any time. Mounting the motor on an adjustable plate in the cabinet leg provides for tensioning the belt or chain. Either flat or multiple-Vee belt or chain drive can be furnished. The machines can also be equipped for single pulley drive from a line or countershaft.

The 14 in. lathe swings 16½ in. over the bed and the 16 in. lathe, 18½ in. Spindle speeds range from 15 to 402 r.p.m., and feeds from 0.004 to 0.112 per revolution of the feed-rod. From 2 to 56 threads per in. can be cut. The weight of the smaller lathe is 2850 lb., and of the larger 3000 lb.





ALL Gears in the Headstock Are Constantly in Mesh. Back gears are mounted in front of the spindle, bringing spindle pressure down against the headstock rather than upward on the bearing caps

Gages Made to Design Committee Standards

PLUG and ring gages that conform in design to the standards specified by the American Gage Design Committee have been brought out by the Brown & Sharpe Mfg. Co., Providence. Each type of gage is made in both "go" and "not go" styles.

Designated as the No. 659, the plug gages are furnished with either single or double-end handles, and in any size or combination of sizes from 0.241 in. to 1.510 in. The "go" gages are easily distinguished from the "not go" gages by their longer measuring surface. All the handles are of hexagonal shape and are finished in black.

The ring gages, known as the No. 664, are available in any size or combination of sizes, from 0.241 to 1.510 in. Rings ranging from 0.241 to 0.510 in. are of two-piece construction with a hardened, ground and lapped bushing inserted in a soft gage body, while the larger rings, sizes 0.511 to 1.510 in., are of solid stock, hardened, ground and lapped to size. The "not go" ring is easily distinguished from the "go" ring by the groove around the outside knurling.

"Go" and "Not Go" Plug Gages in the Double-End Handle Are Shown Below. The "not go" ring gage has a groove to facilitate identification

To perpetuate the name Revere in the industry and in the very business which Paul Revere founded in 1801, the Republic Brass Corporation has been renamed Revere Copper & Brass, Inc. The company's plants are located at Rome, N. Y., Baltimore, Chicago, Detroit, and Taunton, and New Bedford, Mass.

During August and September the consumption of gas coal at 125 steel plants was 1,258,053 net tons, against 1,184,448 tons during the corresponding period of last year, an increase of 73,607 tons, or 6.2 per cent, according to the Bureau of Mines.

Portable Air Drills for Production Work

PROVIDED with speeds of 1000, 1500 and 2000 r.p.m., the new E-O portable air drills recently added to the line of the Rotor Air Tool Co., Cleveland, are intended for production operations. They are manufactured in capacities of ¼, 5/16 and ⅜ in.

Unusually light in weight, less than 4 lb. in all models, the machine may be used continuously with minimum fatigue on the part of the operator. The motor develops more than ½ hp.

Unusually Light Weight Minimizes Fatigue

and the compound gearing gives high torque. All models are furnished with grip throttle and a Jacobs chuck.

New 2½-In. Pitch Roller Chain

FOR large conveyors, industrial locomotives and other heavy-duty applications the Diamond Chain & Mfg. Co., Indianapolis, has brought out a 2½-in. pitch roller chain.

The Chain Is Made in Single and Multiple Strands

This chain is similar to all of the company's roller chain and conforms to standards sponsored by the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the American Gear Manufacturers Association. The average tensile strength is 95,000 lb. per sq. in., the maximum power rating is 97 hp., and the maximum r.p.m. is 240.

Rotary Pneumatic Grinder

IN the No. 88 grinder illustrated, the Chicago Pneumatic Tool Co., 6 East Forty-fourth Street, New York, announces the first of a line of C.P. pneumatic tools employing the rotary principle.

Either Straight or Pistol-Grip Handle Can Be Furnished

A series of four vanes rotates on a spindle in a casing having suitable opening for the admission and escape of compressed air. High efficiency is attributed to even distribution of air upon the vanes, while reduction of weight is due to simplicity of construction. The machine is governor controlled and is equipped with a removable air strainer. It has a heavy-duty radial and thrust ball bearing on the wheel-end, a removable hardened rotor liner, a ball-bearing rotor, and an automatic oiler in the rotor housing, with adequate grease plugs in the handles and the gear case ends.

The machine is designed to carry an 8 x 1 in. rubber or elastic bonded wheel or a 6 x 1 in. vitrified wheel. Equipped with straight handle, the overall length, with wheel guard, is 22½ in., and the weight 15¾ lb. The pistol grip type grinder is 21 in. long overall and weighs 16¼ lb. The rated speed of both machines is 4250 r.p.m.

Synchronous Motors for Tube Mills

What is said to be the largest single installation of synchronous motors in steel mills is to be made at National works, National Tube Co., McKeesport, Pa., to drive the two seamless tube mills. The motors are being made by the Westinghouse Electric & Mfg. Co., East Pittsburgh.

One mill will have two 3500-hp. synchronous motors to drive the piercing mill and the expanding mill and one 2000-hp. synchronous motor to drive the tube rolling mill. The other mill will have two 2000-hp. motors driving the piercing mill and the expanding mill and one 1000-hp. motor for the tube rolling mill.

The motors will be designed with inclosing covers to prevent dirt and dust from getting into the windings. The covers will be connected with an air-filtering equipment which will clean the air and force it into the motor at a pressure of ⅝ oz.

These motors will be designed with very high peak load ratings, each one capable of a 350 per cent load at frequent intervals. Their windings will be insulated for high temperatures and their load-carrying capacity will be far in excess of any machine that has been used for driving any similar mill.

The trustees of Great Northern Iron Ore Properties have declared a distribution of $2 a share on trustees' certificates of beneficial interest in Great Northern Iron Ore Properties, payable Dec. 28 to holders of certificates of record at the close of business Dec. 6, which will make their aggregate distributions for 1929 total $3.25 a share, as compared with $2.75 a share for 1928 and $1.50 a share for 1927.

Device for Stapling Heads in Barrels and Kegs

MARKED savings in labor as compared with hand nailing are claimed for the Staplit machine illustrated, which is being offered by E. H. Titchener & Co., Binghamton, N. Y., for stapling heads in barrels and kegs. The device is lever-operated and quickly drives nail-pointed square-top staples through the hoop (wood or steel) into the head of a slack barrel or keg. It can be used on a 9-in. keg or a 19-in. barrel without adjustment, and by means of a longer rest (the lower bar), it may be employed on barrels of larger diameter.

In addition to savings in labor, assurance that all staples are driven in the head, the driver being set

permanently to locate the staples at the correct level relative to the top of the head, and elimination of the necessity for head liners are advantages claimed for the device. Pliers or a long handled screw driver may be used to open barrels, the heads being removed without damage, thereby assuring maximum salvage value from barrels and kegs.

The staples employed are made from No. 11 gage steel wire, and are ¾ in. wide and 1 in. long on the inside. They are contained in a vertical magazine which is opened by swinging back the cover, using the short lever at the top, and are fed into position automatically. The staples are cemented together in blocks of 25, and four of these blocks represent a full load—sufficient for stapling the heads in 25 barrels or 50 kegs. The operator can staple the heads from one position, and the staples are driven flush with the hoop, both prongs into the head the same depth.

Paasche Airbrush Co., Chicago, has enlarged its New York sales and service branch, which is now located at 103 Lafayette Street. L. J. Dagon continues as district manager.

Railroads Pledge Heavy Buying

Executives Tell President Hoover They Will Help in Business Stimulation—Large Shipbuilding Work Planned

WASHINGTON, Nov. 19.— Railroad executives of the country at the first of the White House business conferences today gave assurance that they would proceed with full programs of construction and betterments without any reference to the recent stock market decline, it was announced by President Hoover following the meeting.

They informed the President that they would canvass the situation as to further possibilities of expansion and that among the railroads represented, including 11 of the largest lines in the country, it appeared that the total volume of such construction work already indicated an increase during the next six months over the similar period a year ago.

Expressing unanimous determination to cooperate in the maintenance of employment and business progress, the statement said, the railroad executives agreed that the whole question should be taken up at their meeting in Chicago next Friday with a view to securing cooperation of all railroads in the United States in the program.

At that time steps will be taken to canvass the railroads to determine the exact amount of construction and betterment which can be undertaken over the forthcoming year and particularly during the next six months.

The railroad executives, it was added, felt that it was desirable that similar conferences should be called in other industrial groups and that some method of coordination of their different activities should be developed.

While no announcement has as yet been made regarding the shipbuilding program, it is expected that something definite will be arrived at within a few days. Indications are that the Postoffice Department soon will advertise for bids for mail contracts and that these contracts will call for the construction of 15 to 20 ships, with a wide range of capacity, running from 8000 to perhaps 40,000 deadweight tons or more. It is not possible to estimate with accuracy the amount of steel which will be required for these ships, but the tonnage will reach large proportions. Rough estimates have been made that it will approximate 150,000 tons or more, of which about 75 per cent will be plates.

These proposed activities, fitting in with the White House business conferences, are looked to as building up public confidence by expansion of industry and employment and thereby assuring a large purchasing power and continued prosperity. The point has been made that there has been no vital interruption in the economic system of the country. Emphasis also has been placed on the fact that the present situation, unlike previous ones, involves no credit crisis and that capital can be readily turned back into commerce.

Members of the Federal Advisory Council representing the 12 Federal Reserve banking districts in the United States, at a meeting with the President, reported business and banking throughout the country in each district are in a sound condition and that prospects are that money will be available at lower rates, according to a statement issued by Governor Young of the Federal Reserve Board.

Today's conference was the first of a series called by the President to consider the business situation. On account of the death of Secretary of War Good, the second has been postponed from Wednesday to Thursday, while the agricultural group meeting, originally scheduled for Thursday, will take place Friday. The conference with representatives of labor, planned for Friday, has been deferred a few days until a time to be announced shortly by the White House.

These conferences will be followed by others as a means of keeping under way the program of "coordinating business and governmental agencies in concerted action for continued business progress," as stated by the President in his announcement on Friday of last week. It is understood that discussions may be held also with State and municipal authorities whose public works program, together with that of the Federal Government, has been surveyed by the Department of Commerce, the purpose being to release highway, building and other construction contracts along with the awarding of contracts by private industry as a means of stimulating both domestic and foreign business. The President is understood to have been in contact with business leaders of the country ever since the crash in the stock market.

It is believed that reserves of private, as well as public contracts, will be released at somewhat earlier dates than had been contemplated, but it has been made clear that none of the undertakings will be of an emergency character. There have been indications, however, that budgets may be enlarged for public works, that of the Government relating to such activities as building construction, highway development and rivers and harbors work, while State and municipal activities also will deal with the first two lines. It is estimated that total expenditures for public work, as originally planned by the various governmental divisions, would be $1,125,000,000, but it is likely that under the impetus of the present movement to aid the industrial situation the outlay will mount to double that figure. Release of private business contracts is expected to involve a widespread range of activities, affecting all lines of industry and necessarily stimulating capital, employment, and agriculture. Greater shipbuilding activity also is expected to develop.

The delay in proceeding with important undertakings has been held by the President to provide "a substantial reserve for prompt expanded action," which can well be used now that the speculative era has passed and capital has been made available at lower rates of interest for constructive lines. The country has reacted with unanimous and hearty agreement to the view of the President that "any lack of confidence in the economic future of the basic strength of business in the United States is foolish."

That money may now be turned back to business activity was brought out by the President when he said:

"The magnificent working of the Federal Reserve System and the inherently sound condition of the banks have already brought about a decrease in interest rates and an assurance of abundant capital—the first time such a result has been so speedily achieved under similar circumstances."

In connection with the building program, Secretary of the Treasury Mellon announced plans to ask Congress for an increase from the original $238,000,000 to $432,000,000 for the Federal Government construction work to be spread over 10 years. The Treasury's plan calls for the use of $15,000,000 within the District of Columbia and the remainder throughout the rest of the country annually.

The Facts About Pig Iron

J. V. W. Reynders Writes of the Tariff Situation and the Status of the Blast Furnace Industry

SOME of the daily newspaper comment on portions of the pending tariff bill has gone wide of the mark. It was fortunate that the New York *World* editorial of Nov. 9 on the pig iron tariff came under the eye of John V. W. Reynders, 120 Broadway, New York. His comment, addressed to the editor of the *World* and given below, covers the ground admirably, while the original editorial illustrates how far the average reader may be led astray in his judgment of conditions in industry:

"The *World* editorial Nov. 9 entitled 'Pig Iron and Protection' is based on so complete a misconception of the relation of the pig iron duty to the steel industry that a correction seems in order.

"You say that 'this is the most important reduction yet voted and is one on which the coalition may well go before the country.' As a matter of fact the argument of the coalition would not be against the steel industry but against certain isolated blast furnaces located in the seaboard States that have to meet not only the competition of foreign iron but also the surplus production of steel works which regard pig iron made for other than their own use merely as a by-product.

"Of the production of 36,700,000 tons in 1925 mentioned in your editorial, 27,700,000 tons was converted into steel in the plants of the makers, invariably in a molten state. This metal is in no wise affected by the duty, as foreign iron could not be put into a molten state at anything like the amount of the duty.

Of the remaining 9,000,000 tons 75 per cent is produced in the interior, where freight charges from the seaboard afford more than ample protection. Therefore the imports of Indian iron—viz., 184,000 tons—constitute a decidedly greater 'menace' than one-half of 1 per cent. The total imports in 1925 from all countries, including India, exceeded 500,000 tons, being more than 22 per cent of the production of so-called merchant iron made in seaboard States.

"Specifically, the duty determines the successful operation of furnaces located at such points as Port Henry, Standish and Troy, N. Y.; others at Everett, Mass.; Chester, Pa., and Ironton, Utah, etc. There could have been no appeal to Mr. Coolidge in 1927 on behalf of steel companies to increase the pig iron duties by 37½ cents a ton. This amount would be insignificant from the point of view of disposing of a by-product. On the other hand, the independent furnaces had every reason to appeal for help, and the fact that their appeal was heard is far from involving a 'rebuke to Mr. Coolidge.' Each ton of merchant pig iron requires nearly two tons of coal in its production and a like amount of iron ore. It provides protection indirectly to these related industries, as well as supplying traffic to the railroads in the relation of five tons to every ton of iron produced.

"Nothing is gained in the building up of our industrial activities by creating erroneous impressions in so involved a subject as the tariff. The pig iron duty was not instituted to increase the profits of the big interests. It is one of the molehills out of which politicians make mountains."

Weirton Steel Plans $7,000,000 Expansion

Program Includes New Type Mill to Roll Diversified Hot-Rolled Products—Ingot Capacity to Be Enlarged

THE Weirton Steel Co., Weirton, W. Va., subsidiary of the recently formed National Steel Corporation, will begin the manufacture of heavy hot-rolled steel products with the completion of a new diversified continuous mill, plans for which are now being completed by Weirton engineers.

According to an announcement by E. T. Weir, chairman of the board of both the Weirton and National companies, the mill will be part of a $7,000,000 expansion program now being inaugurated at Weirton, which will be largely completed by the end of 1930.

The new mill, which will have a monthly capacity of from 25,000 to 30,000 tons, depending upon material being rolled, will embrace many innovations in design, most of which are calculated to give it greater diversity. It will be capable of rolling rails, structural shapes, rounds and squares, and railroad track accessories, including splice bars, tie plates, etc.

The expansion program also includes the addition of about 40 by-product coke ovens, which will increase the Weirton coke capacity by about 50 per cent. The No. 2 blast furnace at Weirton, which is now out for relining, is being enlarged slightly and, when blown in on Nov. 28, it will have a capacity of about 900 tons daily. The older No. 1 blast furnace will be blown out in the near future for rebuilding, and, when completed, will have a capacity of 1100 tons daily, making it probably the largest furnace in the United States.

The company's open-hearth capacity will also be gradually increased with the enlargement and modernization of the first five open-hearths that were erected at Weirton. Their capacity will be increased from around 175 tons daily to between 250 and 300 tons, which is the capacity of the seven more modern furnaces at Weirton. This will give the plant at Weirton an annual capacity of approximately 800,000 tons of by-product coke, 700,000 tons of pig iron and 1,300,000 tons of steel ingots.

Mr. Weir states that the new plant of the Great Lakes Steel Corporation, another subsidiary of the National Steel Corporation, at Ecorse, Mich., near Detroit, probably will be in operation by July 1, 1930. In the meantime, the Detroit blast furnaces of the company's Hanna furnace division are being enlarged and modernized and will be equipped to supply hot metal to the open-hearth furnaces at Ecorse.

Alan Wood Steel Co. Leases New Jersey Mines

The Alan Wood Steel Co. has leased from the Warren Foundry & Pipe Co., for 15 years, the Replogle and Oxford iron mine properties in New Jersey. The purpose of the lease is the establishment of a source of iron ore supply for the steel company's blast furnaces at Swedeland, Pa. It is the intention to put these mines on a production basis as soon as the necessary repairs and modifications in the milling arrangements can be completed. The actual operation of these properties will be carried on by Alan Wood Mining Co., a corporation recently organized for this purpose.

Bethlehem-Steel Corporation Suit Settled

James A. Farrell, president, United States Steel Corporation, and E. G. Grace, president, Bethlehem Steel Corporation, have announced that the suits recently brought by Bethlehem Steel Co. against United States Steel Corporation and certain of its subsidiaries, involving an alleged infringement of patents covering the manufacture and sale of broad-flange sections, have been settled under an arrangement by which United States Steel Corporation and its subsidiaries have been licensed to manufacture and sell such sections under the Bethlehem patents for the remainder of their terms—from 12 to 16 years. The suits are to be discontinued.

Iron and Steel Basket Clause Rate 40 Per Cent

WASHINGTON, Nov. 19.—In its table on page 1318, THE IRON AGE of Nov. 14 gave the iron and steel basket clause tariff rate adopted by the Senate as 45 per cent. It should have read 40 per cent, the Senate having cut the Finance Committee rate of 45 per cent. On page 1319 of the same issue the increased revenue on manganese ore arising from the Senate action of reducing the dutiable grade to 10 per cent was given as $33,600 annually, based on imports of 1928. This should have read $336,000.

Westinghouse Initiates New Pension Plan

Annuity Payment System Guarantees Substantial Incomes for Retired Employees

EMPLOYEES of the Westinghouse Electric & Mfg. Co., East Pittsburgh, who retire at the age of 65 years or older, will be guaranteed substantial incomes for the remainder of their lives as the result of the institution of a new and scientific annuity payment plan, which will affect all of the 50,000 workers on the Westinghouse payroll. Its coverage, reckoned after the manner of group insurance, will be $54,000,000 at the start and $14,500,000 annually thereafter.

Under the Westinghouse plan, which was drafted by Dr. Henry E. Jackson of the Social Engineering Institute, New York, an employee not only receives from the company an earned reward for length of service, but also has an opportunity to buy additional retirement income for himself at a favorable rate. One of its distinctive features is that it offers no obstacle to the employment of older workers, as every employee reaching his retirement age receives his proportionate retirement income. The company's part of the plan's cost will be paid as a regular operating expense, the same as wages and repair costs. The plan sets up a contractual agreement which binds the company to do its part irrespective of what employees may do. Employees will be encouraged, but by no means obliged, to participate in the plan.

At the expiration of every year of service, the employee will receive an annuity certificate entitling him to a number of units of income after retirement. Every retirement income unit will yield one dollar a month beginning at retirement age and lasting for life. The number of units the employee receives annually will depend on his salary or wage. If he wishes, the employee can make his annuity income payable to himself and wife as long as either may live.

"A notable result achieved by this method of drafting the plan," according to Frank A. Merrick, president of the company, is that the hitherto unsolved problem of accrued liability has been eliminated and the uncertain and increasing future cost has been replaced by a known level maximum cost for the entire future. The retirement problem has been solved permanently and inexpensively. The net annual cost of the plan to the company is estimated to be 1.2 per cent of the payroll and by the use of a new budget method the net cost is automatically exhibited every month."

The company's part of the plan will be operated under a deed of trust administered by a board of trustees, with a bank acting as custodian of the funds. This board is composed of Mr. Merrick; J. D. Callery, director of the Westinghouse company and president of the Diamond National Bank, Pittsburgh; T. P. Gaylord and J. C. Bennett, vice-presidents of the Westinghouse company, and J. W. Thompson, vice-president and trust officer of the Union National Bank, Pittsburgh. The employee part of the program will be underwritten by the Equitable Life Assurance Society of the United States.

A striking feature of the plan is that no matter what might happen to the company in the future, those employees who have been retired are assured of receiving their retirement income for life, because cash for this purpose is irrevocably turned over by the company annually to the board of trustees, and in addition a reserve is built up by annual payments to the trustees for those approaching retirement age. With this retirement income system supplementing relief and insurance systems, Westinghouse employees are now protected to a large degree from the three great economic hazards of death, disability and dependence in old age.

No Time to Force Business, Says George M. Verity

"As regards business, the recent drastic decline in the stock market will naturally affect business as a whole to a greater or less extent. Some lines will, of course, be affected more than others. It is certainly not a time to attempt to force business," said George M. Verity, president, American Rolling Mill Co., when interviewed by THE IRON AGE on the current status of the steel trade.

"If industry really wanted to help itself at this time it could not do better than to call off all its salesmen and send them off on a vacation, if necessary. This would aid the consumer in quietly using his inventories and in gradually reaching a time when he has to buy.

"I have never known it to fail, when a business depression occurred, no matter what the cause, that in proportion to the length and depth of the recession a reaction is in due course sure to follow. It usually comes stronger than is expected, for the simple reason that stocks have been depleted and, when business begins to be active again, the buyer must not only cover his current needs, but must build up his inventories again.

"This is no time for pessimism. It is a time for courage and a display of our confidence in the fundamental soundness of things.

"The world moves on irrespective of life and death, of the immediate curve of business activity or the gyrations of our securities markets.

"Business activity, like water, always seeks, and sooner or later finds its level. Nothing short of a five-year period shows the general trend."

Atlantic Steel Reports Sound Conditions in South

The Atlantic Steel Corporation, Atlanta, Ga., has declared an extra dividend of $2 a share on the common stock at a meeting of directors on Nov. 13. This is in addition to the regular dividend of $1.50.

"This action was taken after a careful review of the operating results obtained in the first 10 months of this year," said Robert Gregg, president. "It was the view of the directors that conditions in the company's trade territory were on a sound basis, as shown by the volume of buying for current and near-future needs. Inventories throughout the territory seem to be low and at very reasonable prices, making for a thoroughly sound position of all buyers and users of steel products. The directors were of the opinion that the present sound economic conditions in this territory would not be adversely affected by current fluctuations in the New York stock market."

Production and Shipment of Raw Materials and Finished Products

	October, 1929	September, 1929	October, 1928
Railroad locomotives shipped(a)	96	75	36
do., ten months	688	.....	471
do., unfilled orders(b)	423(c)	429	170
Bituminous coal mined(d), net tons	51,200,000	44,515,000	51,176,000
Anthracite(d), net tons	8,235,000	6,792,000	8,400,000
Beehive coke made(d), net tons	465,600	504,400	431,000
	September, 1929	**August, 1929**	**September, 1928**
Electric power production(e)(f)	7,997,814	8,284,592	7,276,000
do., by water-power	2,479,066	2,839,137	.....
Sheet-metal ware shipments:(a)			
Galvanized, dozens	173,267	163,321	189,789
do., value	$676,841	$673,665	$742,180
Enameled, dozens	338,169	385,162	252,484
do., value	$1,414,995	$1,371,354	$1,372,242

(a) United States Department of Commerce.
(b) End of month.
(c) Lowest since February.
(d) United States Bureau of Mines.
(e) Thousands of kw.-hr. made by public utility power plants.
(f) United States Geological Survey.

Plans Perfected for Manufactures Census

Cooperation of Industry to Be Sought Through 17 District Conferences, Which Will Be Broadcast

PLANS are being laid to insure prompter and more accurate returns in the coming decennial census of manufacturing operations. Under the chairmanship of Col. L. S. Horner, president, Niles-Bement-Pond Co., New York, the Advisory Committee on Manufacturers appointed by Secretary Lamont last summer has arranged to make a thorough-going campaign to arouse general interest in the work.

The United States has been divided into 17 districts. Every community of any size in each of these districts will be card-indexed, and the local trade association and service clubs within 100 miles of a central city will be asked to send delegates representing local manufacturers and distributers to a conference. Communities outside the 100-mile limit will be reached through correspondence.

To Confer on Friday

The first of these conferences, which are being arranged under the direction of John E. Palmer, will take place Nov. 22 at the Pennsylvania Hotel, New York. Addresses will be delivered by Dr. Julius Klein, Assistant Secretary of Commerce; Col. L. S. Horner; F. M. Feiker, chairman of the Advisory Committee on Distribution, and W. M. Steuart, director of the Bureau of Census. The speeches will be broadcast over the Columbia-National network. Conferences will be held in other cities as follows:

Nov. 25—Bellevue Stratford Hotel, Philadelphia.
Nov. 27—Atlanta-Biltmore Hotel, Atlanta.
Nov. 29—Statler Hotel, Detroit.
Nov. 30—Hotel Statler, Buffalo.
Dec. 2—Hotel William Penn, Pittsburgh.
Dec. 4—Statler Hotel, Cleveland.
Dec. 5—La Salle Hotel, Chicago.
Dec. 7—St. Charles Hotel, New Orleans.
Dec. 9—Jefferson Hotel, Dallas, Tex.
Dec. 11—Statler Hotel, St. Louis.
Dec. 12—Fontenelle Hotel, Omaha, Neb.
Dec. 14—Brown-Palace Hotel, Denver.
Dec. 17—Olympic Hotel, Seattle, Wash.
Dec. 19—Claremont Hotel, San Francisco.
Dec. 20—Los Angeles Biltmore, Los Angeles.
Jan. 4—Boston Chamber of Commerce, Boston.

Representatives at the conferences will learn the practical value of the censuses to their communities and the methods used by other communities in assembling data both on manufactures and distribution. They will be asked in turn to do five things: First, give the local papers a report of the district conference; second, keep the local papers informed of local and national developments of the census work; third, organize a meeting of local manufacturers about the middle of January, to be addressed by a speaker furnished by Mr. Palmer; fourth, organize a meeting of local wholesalers and distributers about the middle of April, to be addressed on the census of distribution, and, fifth, to deliver a short talk over the local radio.

Cooperation to Speed Results

Through these methods the Bureau of Census hopes to expedite action so that reports on production operations will be available to the bureau at Washington by the middle of February. This would enable the bureau to deliver the basic data back to manufacturing industry within six months. In addition, the bureau believes that many thousands of dollars will be saved to the Government through more accurate returns and a reduction in field work.

Contractors See Benefits from Stock Deflation

Stabilization of the stock market at moderate levels and a recession in the volume of stock speculation should have a beneficial effect on the volume of construction contracts awarded, in the opinion of the Associated General Contractors of America. This organization says:

"The decline in contract awards evidenced so far this year by a 25 per cent reduction in the commitments for residential construction, as shown by the statistics of the F. W. Dodge Corporation, is seen as a result of difficulties in arranging for financing. With funds from all over the country actively employed in stock speculation, financing for local construction has been difficult to secure, especially for apartment house and hotel construction, it is claimed.

"This recession in residential construction contract commitments has only just begun to affect the demand for labor and construction materials, according to a statistical study just completed by the Associated General Contractors. The volume of construction job activities during October as indicated by shipments of basic construction materials declined 26 points to index number 233. Despite this drop in October the level of job activities during the first 10 months of 1929 was only one half of 1 per cent less than the volume of activities for the same period in 1928.

Carry-Over of Contracts

"The maintenance of job activities in the face of a recession of contract awards is accounted for by the existence of the carry-over of uncompleted contracts into this year. Unless financing soon becomes available for contemplated residential construction that is being held up it is believed that the volume of construction activities will recede to levels proportionate to the volume of contract awards.

"Outside the residential field contract awards are shown to be slightly above the totals of last year so that recovery in this one field of the industry will allow construction activities to be maintained at levels equal to those of the past. As recovery in residential contract awards is seen to be dependent upon the stabilization of the stock market and the release of funds for building financing, construction circles do not view the recent collapse of the stock market as an unmitigated calamity."

Foundry Equipment Makers Busy

Foundry equipment orders for October are reported at 245.3 on the basis of 100 as the average monthly shipments for 1922-1923-1924. Deducting cancellations, the net orders are 240.3, as reported by the Foundry Equipment Manufacturers Association. Shipments are given as 214.1 and unfilled orders as 492.5. The three-month average of gross orders was 230.3.

The index of gross orders for October was the highest since August, 1928. With the further exception of May, 1928, it was the highest on record. The three-month average was the highest ever recorded, exceeding the 218.7 of a month earlier by 5 per cent.

Shipments were the highest since last May, but were considerably lower than in October of last year. Unfilled orders were, with one exception, the largest on record. That exception was September, 1928, when 529.5 was indicated. September, 1929, had shown the previous second highest record in unfilled orders.

Employment and Payroll Totals in Identical Plants in September and August (a)

	Establishments	Number on Payroll		Weekly Payroll (b)	
		September	August	September	August
Iron and steel	201	280,559	284,312	$9,085	$9,239
Foundry and machine shop	1,065	290,719	289,499	8,860	8,929
Machine tools	150	42,577	41,418	1,387	1,326
Hardware makers	69	31,951	30,965	821	800
Steam and hot-water appliances	109	32,581	32,311	961	936
Stoves	114	20,982	19,771	587	539
Structural ironwork	173	30,068	29,795	930	916
Cast iron pipe	38	11,954	11,926	286	286
Automobiles	217	435,914	442,989	14,355	15,280

(a) United States Bureau of Labor Statistics.
(b) Thousands of dollars.

This Issue in Brief

Two good years, then one bad. The cycle that appeared in the late pre-war years has reappeared since the post-war boom. Economist says 1930 looks like a dull year, but there is "no reason as yet to forecast a serious business depression."—Page 1373.

* * *

Welding costs can be cut by teaching welders to work faster, using larger flames, decreasing the angle of vee, and keeping the weld narrow.—Page 1385.

* * *

Reduces oil consumption about 2 gal. to the ton of steel by superheating the steam for atomization to 700 or 800 deg. Fahr.—Page 1384.

* * *

Annealing improved sometimes by slight oxidation, says engineer. Oxidizing gases are under absolute control with electric furnace. Superiority of results, he says, offsets higher cost.—Page 1387.

* * *

Zinc spraying competes strongly with galvanizing in Europe. Protective skin of zinc oxide is formed speedily by treating sprayed coat with sodium chloride. Resistance to sea water and air corrosion is very high.—Page 1371.

* * *

Welded building cost $8 a ton more than riveted, says riveting machine manufacturer. Make walls sound absorbent, to escape din of riveting.—Page 1381.

* * *

New market for malleable castings. Withstand successfully both laboratory and service tests, proving that uses for malleable iron need not be restricted to small castings.—Page 1364.

Discovery may cause important change in open-hearth practice. Amount of iron oxide dissolved in liquid steel is much higher than heretofore supposed. Emphasizes necessity for more careful study of deoxidizers.—Page 1366.

* * *

Tungsten carbide "tipping problem" solved. Copper brazing in hydrogen atmosphere has proved satisfactory in most uses. If welded on, the tungsten carbide may crack. Better let the tool materjal manufacturer do the tipping if you have little to do. —Page 1369.

* * *

Stock crash due to absence of "short" cushion, economist suggests. Persistent upward course of prices drove the short seller out of the market, so there was no cushion to break the force of the panic.—Page 1372.

* * *

Metal-spraying with aluminum, tin, copper and lead presents problem of pores in the coated layer. Best results are obtained by treatment with chemicals which react with the metal.—Page 1371.

* * *

Flaw detector not always accurate, says railroad man. Can not be called highly successful, he says, but method is promising. He used early model, says detector maker; present model is better.—Page 1366.

* * *

Intermittent cuts can be made with tungsten-carbide tools if extreme rigidity prevails. Surround and reinforce the carbide insert on all sides, where it would normally be in tension. It has great compressive strength, but little tensile strength.—Page 1370.

Assemblers work faster if wheels are put on last. Durant waits until all assembly work is done before adding wheels, so that assemblers are not hindered. —Page 1374.

* * *

Lone manufacturer will lose in business struggle, says trade association manager. Urges fabricators to unite forces and extend facilities in battle for markets. —Page 1380.

* * *

Architects "discover" white metal. Large quantities are used in new business buildings. Monel and rustless iron are used, but aluminum and its alloys lead.—Page 1361.

* * *

Grinding tungsten-carbide tools no longer a problem. Best results, Dr. Jeffries believes, are obtained by using artificial abrasives of the silicon-carbide family, such as carborundum or crystolon.—Page 1369.

* * *

To speed the cleaning of the molten steel, add ferromanganese ahead of the ferrosilicon. With deep bath, it might be better to kill the steel in the ladle instead of in the bath.—Page 1383.

* * *

Aircraft fuselege welds, pickled in acid for 24 hr., get 100 per cent rating. No cracks or other weaknesses visible under magnifying glass. Tension tests of joints showed full rated strength. —Page 1386.

* * *

Wire-drawing die costs cut in half by tungsten carbide. Ratio in saving in die cost better than 2 to 1. With smaller wire, overall improvement in cost compared with diamond die was 6 to 1.—Page 1369.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Propaganda Out of Order

THE present is no time for propaganda. Publicity and advertising containing obvious misstatements regarding the current state of business do not delude; they may only accentuate the lack of confidence they are intended to dispel.

The aftermath of the stock panic has enough encouraging features without drawing on the imagination. There is no credit strain; on the contrary the Federal Reserve ratio is high and New York discount rates have been reduced twice since the stock market landslide started. Commodity prices are not inflated and business is not burdened with swollen inventories built up at high prices.

These fundamentally strong factors help explain why the country has remained free from wholesale cancellation of orders, sharp breaks in commodity markets, widespread closing down of plants and correspondingly large increases in unemployment, such as were immediate sequels of other stock market crashes.

The situation has much in it that is heartening; but business men know that nothing is to be gained by ignoring the unfavorable side of it. Among the adverse factors are the large quantities of frozen funds tied up in securities, and recently increased to save margins, which will reduce consumer buying power as effectively as actual monetary losses in speculation. Some of these accounts, moreover, threaten to cause further liquidating movements, so that an uncertain, fluctuating stock market may persist for some time to come.

It is also recognized that installment buying will be subjected to severe test, although conservative opinion is that defaults on payments will not become serious unless unemployment assumes alarming proportions. Happily, constructive measures set in motion by President Hoover will do much to ward off that danger. Corporations with large cash reserves—and there are many of them—are able, and with Government encouragement are expected, to initiate undertakings that will provide work for large numbers of men. Similarly Federal public work is likely to be accelerated, and there are indications that State and municipal projects will be expanded and expedited.

Much can and will be done to tide the country over the period of readjustment that it faces. There is no reason for pessimism. On the other hand, it would be too much to expect a continuation of flush times, which got so much support from lavish purchases out of stock market profits.

Reappraising the "New Era"

DURING the last seven years of activity it has been said repeatedly that we were in a new era. The catastrophe of the stock market raises several questions about this. Was it really a new era and if so has the era ended? No categorical answer can be given to either of these questions. There is much that is new, easily distinguished as such; but the problem is to distinguish between the new things that seem permanent and those about which there is either doubt or a certainty that they have dropped out or will.

The public was disposed to take it that nearly everything new that appeared in the industrial and economic situation was permanent and now it has found that one thing in which it took great interest, advancing stock market values, was not permanent. A reappraisal is accordingly necessary.

In the reappraisal we can reduce various things to fundamentals and thereby segregate what is permanent from what is not. The efficiency we attained in the war and the enlarged views of what we can do are permanent. The better understanding between employers and employees and the better treatment are permanent. So also is the belief that well paid labor is a first essential to maintain consumption. Realization of the value of research is permanent. The higher standard of living is permanent, and no error can be made about that because we have the testimony even of the past. Burton, in his classical "Crises and Depressions" published in 1902, says that the people always emerged from a period of depression with a higher standard of living than they had previously enjoyed. There was no going backward except temporarily even in the old order of things which we know is largely altered.

Next we have a matter not so simple. We do learn something by experience. It was before the war that there came recognition of a periodicity in our ups and downs in business. Foreseeing that there might be a panic in 1913, following those of September, 1873, and June, 1893, some men made preparations. There was already some recognition that the cycle was not necessary; the accuracy of this statement is indicated by reference to editorials in THE IRON AGE, Dec. 4, 1913, "The Cycle and the Iron Trade," pointing out that a previous parallelism had broken down; Sept. 17, 1914, "Cyclical Depression—an Obituary"; Oct. 1, 1914, "The Lost Panic of 1913."

Since the war much more statistical and other information has been available and there has been more

thinking. We may assume, if not as an absolute fact at least as a good working hypothesis, that business men avoided excesses and that thus the familiar cause of reaction and depression was avoided. That carries us up to the recent portion of this seven-year period of activity. The boom in the stock market and its influence upon general trade is the new thing that is not permanent, for it is even now gone; it is also chief of the unfavorable economic features of the "new era." Thus there must come a readjustment following the speculative excesses of these many months. From giving thought on a scale wholly without precedent to getting gains by stock speculation, millions of our people will now have a new respect for the old-time practice of working and saving and of buying for investment.

In Dispraise of Corrugated

SIGNS multiply that architects, artists and designers are paying more and more attention to metal and are developing the aesthetic possibilities of this medium at a rapid rate. Of course we have inherited many beautiful objects worked in metal in years gone by, such as bronze statues and ornamental iron grilles, not to mention productions of silversmith, armorer and jeweler. But we are now discovering that inlaid or embossed metal can enrich the interiors of public buildings and offices; that even so prosaic a thing as a kitchen sink can be good-looking as well as convenient.

No little credit for this is due to progress in the metallurgical industries. New metals and alloys, ductile yet stainless steels, have been produced at a moderate cost and with beautiful and durable surfaces. Gas welding and metal spraying enable the artisan to execute readily designs formerly all but impossible.

Secretary of the Treasury Mellon recently summarized very aptly the reasons underlying this trend toward art in industry when dedicating a monumental structure to be used as a railroad station. He said, "It is a bad investment to build anything that does not conform to those standards of good taste that have stood the test of time." Such sentiments would probably be pooh-poohed by a group of emancipated artists of the modern school. A cubist given free rein erects a building like the glass and metal church at Cologne, which really looks like a fantastic greenhouse. If he built a bridge, it would probably violate so many principles of engineering that it would rapidly emulate the celebrated London bridge of our childhood game. Yet bridges, even of steel, can be harmoniously blended to the surrounding landscape without relying upon the newest of the new art, as is proved by a series of photographs recently published by the American Institute of Steel Construction. A glance through them indicates that they are nearly all low sweeping arches or suspension bridges, suggestive of the lines of the Allegheny River bridge at Pittsburgh, recently voted the most beautiful bridge built during 1928.

A bridge builder must use his metal practically without ornamentation; an architect has the opportunity not only to achieve a distinctively American form for tall buildings, but is able to use new materials for their ornamentation. He wishes to accentuate the vertical lines, so he uses lead or aluminum spandrels between the windows. Bold ornamentation of the structure he reserves for the top; so he uses gigantic figures cast in bronze or aluminum, or sheathes a tower in glittering white metal. Façades, extending up a few stories, entry halls and elevators —parts of his building seen close up—he trims with copper, bronze, monel, or stainless steels, either in plain moldings, fret work, inlay, or bas relief. Costly woods he replaces by more durable yet equally appropriate metals for interior decoration and even for furniture.

Enthusiastic though we are about this new trend in architecture, an involuntary protest arose recently when called upon to admire a pedestrian bridge in Chicago, sheathed entirely with a polished iron alloy, for all the world like shiny corrugated iron. And now comes a drawing of the 100-story office building proposed by the Metropolitan Life Insurance Co. It looks as though some one had got an enormous roll of corrugated strip and pulled the central coils out to get an ascending spiral, as Doré would have conceived the Tower of Babel, but with surfaces fluted vertically. "Instead of placing windows occupying, as is customary, less than 50 per cent of the whole surface of the building and recessing these windows within masonry reveals," says the architect, "the entire surface between the steel supports will be made of metal and glass, these surfaces being projected somewhat like a shallow bay window, glass being carried to ceiling level to give the maximum light."

We can admire corrugated iron on a roof for its durability, or on the siding of a mill building for its utility, or a corrugated building for the amount of metal on its surface; but something prevents us from seeing anything beautiful in it. Perhaps it is a case of artistic astigmatism.

An Instrument of Market Expansion

AS an agency for the development of markets, including the discovery of new fields of consumption, the trade association has well proved itself in the case of the steel fabricators' organization. As brought out in the report elsewhere of the annual meeting of this body, the short space of seven years has shown an astonishing growth of influence. City after city has accepted, in whole or in part, its recommendations for steel building work. The professional and business world likely to be interested has been fairly flooded with steel building literature. The stamp of authority based on results seems unquestioned. Aggressive studies to find new uses for structural steel have uncovered definite items. Steel deck floors, even for residences as well as multi-storied buildings, promise an outlet for even a greater tonnage of plates than is absorbed for railroad cars. The attitude of the institute's staff is that steel is an excellent material for many forms and sizes of dams, or it intends to know why not.

In respect to business practice, the association has composed many differences among the member companies. It has established standard specifications and a code for the industry and it has published a sales manual and directed sales meetings of member representatives. Its membership was instrumental in furthering a trade practice conference instituted under

the auspices of the Federal Trade Commission. In a word, the institute has done all that could reasonably be expected from a trade association, especially considering its short existence.

One outstanding problem which it has not solved is a basis of relations with the producers of structural shapes—the suppliers of its major raw material. The signs are that the steel makers have come to regard highly the efficacy of the institute and are in a mood to cooperate more fully than in the immediate past, and this means, of course, in the way of a sizable money contribution to further the work of promoting consumption. The immediate need seems to be for group action by the steel producers for an equitable apportionment of the support. That they are favorable to some joint action is taken for granted. What seems to be lacking is the machinery to set up a negotiating organism; but as the will grows to foster the movement, the way will be found.

Prospects for Exports of Capital

FOLLOWING the decline in interest rates and the reduction in collateral loans it is natural to expect an increase in the flow of American capital into foreign investments. This, however, would be merely a reversion to the practice prior to about the middle of 1928, which means two things—that it is likely to occur and that it will have no great long-range significance.

At the beginning of last year interest rates were low. They advanced somewhat during the first half and sharply in the second half while the stock market underwent a great advance. The offering of foreign securities showed a great decrease at the middle of last year, and that was not seasonal. Of the total offerings in 1926, 45 per cent were in the first half and 55 per cent in the second half; in 1927 there was a 50-50 division, and in 1928 the division was 70 per cent first half and 30 per cent second half. Thus far this year the offerings have undergone a further decrease.

In 1923 there was a sharp dip in these offerings, there being a fairly steady increase thereafter. Offerings in the first half of 1928 were at a rate 32 per cent above the 1927 total and 59 per cent above the 1926 total. In the second half of 1928 they were only 55 per cent of the rate during the preceding two and a half years, and this year have been running lighter still.

During this former period there was much criticism of our lending so much money abroad and now if the practice grows again there may be repetition of the criticism. There is an outstanding fact in this matter observable without analysis in detail—that whereas the critics predicted cumulative ill effects the passage of time with increasing loans abroad did not strengthen their case.

The exhaustive compilations and estimates of the Department of Commerce published annually in "The Balance of International Payments of the United States," the last issue covering data through 1928, show how many offsetting items there are, whereby the billions of dollars frequently cited as representing our loans abroad are greatly scaled down. How large and complicated is our account with the outside world is shown by the fact that for 1928 the debits and credits each totaled over ten billion dollars, whereas the net capital movement is computed at only 962 millions.

With the cumulative experience of several years it is found that the thing has not become top-heavy, for it is fair to assume that the decrease in lending abroad which occurred at the middle of last year was due to money rates and stock speculation. Without going into details of various counterbalancing items, the finding of the Department of Commerce in the last presentation, up to the end of last year, may be cited: "The American nation having now seen five or six successive years in which the par value of foreign capital issues was over a billion, it is rather surprising that during the seven years ended with 1928 our net export of capital was only $3,253,000,000" as estimated, and this would be reduced to $2,982,000,000 if receipts of principal on the war debts to the United States Treasury were considered.

Both by reason of the change in money rates and stock speculation and of the need for stimulating exports the prospect is that there will now be a return to the practice of lending what seem like large sums abroad. Even at this late date harmful results have not become visible. True, it might look better if we had need for all our capital at home, but we seem to have a sufficient supply for both home and foreign interests.

Suggests Remedy for Enamel Blisters on Cast Iron

INVESTIGATION of a problem which has caused a good deal of worry to manufacturers of enameled cast iron ware has been completed by the Bureau of Standards after several years' study. It had been found for a long time by different manufacturers that certain irons showed a pronounced tendency to the formation of blisters in the enamel. This had come to be associated finally with different kinds of cast iron. For example, Southern cast iron was said to be "non-blistering," whereas Northern cast iron of essentially the same composition was classed as "blistering." The problem has been a very obscure one and a great many false leads have been followed.

According to the report, the blistering tendency cannot be ascribed to any particular composition. Blistering is dependent upon the presence of a thin surface film of chilled metal which may exist even in ordinary castings. The carbon in such a "micro" chilled layer is in a condition very favorable to the formation of the gas which gives rise to the blisters in the enamel when it is fired. The remedy is simple and efficient. It consists in the removal of the surface of the casting before enameling, preferably by sand blasting.

Central Alloy Increasing Stainless Steel Capacity

Current output of stainless steel by the Central Alloy Steel Corporation is the highest since production of the new material was started under Krupp license, it is announced by Chairman F. J. Griffiths. Notwithstanding larger production, deliveries of stainless are from six to nine weeks behind orders. Demand has been increasing rapidly with the development of new markets in the automotive, pipe, building and many miscellaneous lines.

In order to supply demand for stainless steel, the company is expanding productive facilities as rapidly as possible, Mr. Griffiths said. Latest steps in the expansion program include installation of an automatic pack furnace, five double cabinet sand blasting machines, a double tank mechanical pickling machine and a 2500 cu. ft. air compressor. In addition, a new 25-ton electric furnace is being constructed. Completion of these improvements around the first of the year will enable the company greatly to increase production.

Newport Naval Station to Sell Scrap Tonnage

Bids will be opened Dec. 5 by the United States Naval Torpedo Station, Newport, R. I., on a tonnage of iron, steel and non-ferrous metal scrap. Material to be sold includes 150 net tons of mixed borings and turnings, 100 tons of miscellaneous iron, steel and non-ferrous metal scrap, 110 metal drums of 50 to 55-gal. capacity, 73,000 lb. of brass, copper and bronze scrap, 4000 lb. of monel metal scrap, 1000 lb. of bronze dross and skimmings and 123 grinding wheels.

Record Iron Ore Shipments Through Sault Locks

Shipments of iron ore through the Sault locks this year has set an all-time record, according to the monthly statistical report of the United States Engineer's office. The total to Nov. 1 was 17,457,000 tons greater than during the entire season's total of any previous time, including shipments during the period of the World War.

To Build Suspension Bridge of 4500-Ft. Span

A bridge with towers exceeding the height of the Woolworth Building in New York will be constructed in commemoration of the American soldiers who fought in France, according to D. B. Steinman, consulting engineer, in an address Nov. 13 before the seventh annual convention of the American Institute of Steel Construction, meeting at Biloxi, Miss. Doctor Steinman reviewed the past 50 years of bridge building, years during which steel has been available, and described some of the most massive bridge structures in the world.

The Liberty Bridge, across the Narrows on New York Harbor, he said, will be 4500 ft. between the main piers and 235 ft. above high water. The main span of the proposed bridge will be 1000 ft. longer than the main span of the Hudson River Bridge, now building, which, in turn, is nearly twice the span of the next greatest bridge.

Each tower will be 800 ft. high. The main cables from which the bridge is to be suspended will measure 48 in. in diameter, each containing 48,000 wires, and the strength of the wire will be 240,000 lb. to the sq. in. The towers will be artistically designed in steel and unadorned, he said, and the whole structure will express the "Spirit of Steel." Observation platforms will crown the towers, which will be equipped with a carillon of bells and with beacon lights.

—

Doubt has been expressed that such a bridge would ever be built, inasmuch as the city has authorized construction of a tunnel under the Narrows to carry traffic between Staten Island and Brooklyn.—EDITOR.

The Week in Business

Drift of Current Financial and Economic Opinion

INTEREST in post-mortems is waning. With marked adaptability the American public is readjusting itself to the conditions imposed by a major stock market panic and is already seeking practical ways of minimizing their effects on business.

That serious havoc has been wrought is commonly recognized. As observed by Col. Leonard P. Ayres, a shrinkage in stock market values exceeding our entire expenditures and loans during the World War cannot fail to cause widespread and serious actual losses to thousands of people, wiping out large savings and creating a vast volume of unproductive indebtedness.

But, as is well put by Theodore H. Price, *Commerce and Finance*, "Business in America has become an enormous force. Any serious diminution in its volume seems to be unlikely, and the distress that the recent panic has caused will be forgotten just as soon as hope again takes possession of this hopeful people."

Government Action Salutary

Nothing has done more to inspire hope and restore confidence than the constructive measures undertaken by the Federal Government. The assurance of prompt action to reduce income taxes 1 per cent on both corporations and individuals is hailed as a welcome measure of relief by the *Commercial and Financial Chronicle*. The tax cuts, it declares, "are sure to prove a stimulus to trade, whether trade is to remain good or take a turn for the worse."

Of far greater immediate promise are the conferences of business leaders called this week by the President to formulate plans for offsetting business reaction. The cash position of important corporations is excellent, warranting the release of projects to provide employment. What is more, the Government itself is preparing to speed up Federal work and to encourage shipbuilding through loans and mail contracts.

No Disastrous Sequel of Crash

With this organized remedial effort under way, it is gratifying to note that results of the stock market collapse to date have not been alarming.

"We are already able to say," writes Alexander D. Noyes, New York *Times*, "that there has been no shutting down of business houses, no crash in prices of manufactured products, no sweeping reduction of working forces, such as occurred in immediate sequence to nearly all of the older Wall Street panics. Prices of staple goods fell 10 per cent in the weeks of the 1920 panic; a week or two after the panics of 1907 and 1893, manufacturers were discharging employees by regiments."

Credit Easy, Commodities Uninflated

Freedom from credit strain and absence of commodity price inflation are the two outstanding characteristics distinguishing the recent stock market break from other Wall Street crises, and they indicate a basically sounder condition of finance and industry at the present time, according to the Alexander Hamilton Institute.

"This year the banking situation is sound," it observes. In place of increased credit stringency after stock prices broke, as in 1919-1920, "the end of the first week of the break this fall witnessed a reduction in the rediscount rate at New York."

Iron and Steel Markets

Steel Trade Regaining Confidence

Output Declines Further But Buoyancy of Demand in Certain Lines Allays Fear of Drastic Slump —Scrap Continues to Weaken

THE manner in which business has withstood the shock of the Wall Street panic has done much to restore confidence among buyers and sellers of iron and steel. While the output of furnaces and mills has undergone a further decline, consumption has shown no general curtailment and in a number of leading lines has held its own or has gained.

Entirely apart from the heartening effect of President Hoover's conferences, the news of the week is favorable. The large demand for fabricated structural steel is being maintained, 107,000 tons has been added to rail mill backlogs, farm machinery plants have further expanded their operations, there has been another impressive increase in prospective railroad equipment business and large tin plate contracts have been closed for 1930. The outlook in electrically-welded pipe has been brightened by the placing of an order for a California gas line and the reinstatement of line pipe contracts suspended several weeks ago.

These evidences of sustained activity are not interpreted as indicating an early increase in steel output, but rather as an assurance that drastic general curtailment of consumption is not in prospect. With inventory-taking approaching, business will soon feel the effects of the year-end lull, although releases for January rolling of some products will reach the mills in December.

Steel ingot production of Steel Corporation subsidiaries now ranges from 72 to 74 per cent and it is doubtful whether any producer is operating at more than 75 per cent of capacity. Operations of Valley plants have declined to 50 per cent and the rate in the Pittsburgh district is down to 70 per cent, while Chicago output holds at 75 per cent.

Specifications for steel from the automotive industry have continued to recede, and further curtailment is in prospect. However, it is understood that the Ford company will get under production on its new models as quickly as possible and will shortly release sizable tonnages of sheets and other mill products. Two or three Detroit makers of higher-priced cars are now operating at a good rate on new models, while in the Chicago district an important motor car builder has resumed output at 65 per cent of capacity and a large parts maker is ordering steel.

Scrap markets have given further ground in keeping with the reduced requirements of steel plants. Heavy steel scrap has declined 75c. at Pittsburgh and 25c. at Chicago.

Mills have reaffirmed prices on tin plate, wire products and strip steel for first quarter. Specifications for tin plate are beginning to show improvement and the tonnage released prior to Nov. 15 for January rolling was of encouraging proportions. Blue annealed sheets are now generally quotable at 2.25c., Pittsburgh, for No. 13 gage and 2.10c. for No. 10, or $2 a ton lower than prices recently asked by jobbing mills.

Rail orders for the week include 57,000 tons for the Rock Island, 40,000 tons for the Illinois Central and 10,000 tons for the Boston & Maine. Purchases of rails to date for 1930 laying total 1,500,000 tons, and it is estimated that 750,000 tons still remains to be placed. The Southern Pacific has bought 18,000 tons of track supplies. Locomotives ordered during the week total 64, and inquiries for 250 are pending. The Chesapeake & Ohio and the Pere Marquette are expected to ask for figures shortly on 10,000 cars. The New York Central's program for next year calls for the purchase of 15,000 cars.

Shipbuilding plants, already heavily booked, have much additional work in prospect. The United States Lines have taken bids on two ships of the Leviathan type, requiring 20,000 tons of plates and shapes each. The Export Steamship Corporation plans to build two additional vessels. Indications are that the Post Office Department will soon advertise for bids for mail contracts which will result in the construction of 15 to 20 ships, requiring a total of 150,000 tons of steel.

Fabricated structural steel contracts for October, as reported by the Department of Commerce, totaled 342,650 tons, compared with 319,550 tons in September. Awards for the past week, at 41,000 tons, were fairly large. Fresh inquiries aggregate 60,000 tons, including 40,000 tons for a Cincinnati railroad terminal. The release of both private and public work, as a result of the President's conference, will further stimulate building. Federal, State and municipal construction budgets for 1930, originally estimated at $1,125,000,000, are likely to be doubled, according to Washington advices.

Pig iron melt has fallen off in some lines outside of the automotive industry, but this recession is offset, at least in part, by the increased requirements of foundries serving the railroad car builders and the farm equipment makers. Prices are softer in some districts, but producers of merchant iron evidently plan to avoid accumulating surplus stocks by reducing their output. Three Valley stacks have been blown out or banked in the past 10 days, and a Buffalo furnace may go out this week.

THE IRON AGE composite prices are unchanged, pig iron at $18.38 a gross ton and finished steel at 2.362c. a lb. Pig iron is 16c. a ton lower than a year ago; finished steel, 14c. a ton lower.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous, Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Nov. 19, 1929	Nov. 12, 1929	Oct. 22, 1929	Nov. 20, 1928
No. 2 fdy., Philadelphia	$21.26	$21.26	$21.26	$21.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	17.69	17.69	17.69	20.19
No. 2, Birmingham	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa	19.75	19.75	19.75	19.75
Basic, Valley furnace	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	20.01
Malleable, Chicago*	20.00	20.00	20.00	20.00
Malleable, Valley	19.00	19.00	19.00	18.25
Gray forge, Pittsburgh	19.76	19.76	19.76	18.76
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	105.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	35.00	35.00	35.00	33.00
Sheet bars, Pittsburgh	35.00	35.00	35.00	33.00
Slabs, Pittsburgh	35.00	35.00	35.00	33.00
Forging billets, Pittsburgh	40.00	40.00	40.00	38.00
Wire rods, Pittsburgh	40.00	40.00	40.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.95
Bars, Chicago	2.00	2.00	2.00	2.00
Bars, Cleveland	1.90	1.90	1.90	1.90
Bars, New York	2.24	2.24	2.24	2.29
Tank plates, Pittsburgh	1.90	1.90	1.95	1.90
Tank plates, Chicago	2.00	2.00	2.05	2.00
Tank plates, New York	2.17½	2.17½	2.22½	2.22½
Structural shapes, Pittsburgh	1.90	1.90	1.90	1.90
Structural shapes, Chicago	2.00	2.00	2.00	2.00
Structural shapes, New York	2.09½	2.14½	2.14½	2.19½
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.20
Hot-rolled strips, Pittsburgh	1.90	1.90	1.90	1.90
Cold-rolled strips, Pittsburgh	2.75	2.75	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel, *Per Lb. to Large Buyers:*	Nov. 19, 1929 Cents	Nov. 12, 1929 Cents	Oct. 22, 1929 Cents	Nov. 20, 1928 Cents
Sheets, black, No. 24, P'gh	2.75	2.75	2.75	2.75
Sheets, black, No. 24, Chicago dist. mill	2.85	2.85	2.95	2.85
Sheets, galv., No. 24, P'gh	3.40	3.40	3.50	3.50
Sheets, galv., No. 24, Chicago dist. mill	3.50	3.60	3.60	3.60
Sheets, blue, No. 13, P'gh	2.25	2.35	2.35	2.10
Sheets, blue, No. 13, Chicago dist. mill	2.45	2.45	2.45	2.20
Wire nails, Pittsburgh	2.40	2.40	2.40	2.55
Wire nails, Chicago dist. mill	2.45	2.45	2.45	2.55
Plain wire, Pittsburgh	2.40	2.40	2.40	2.40
Plain wire, Chicago dist. mill	2.45	2.45	2.40	2.45
Barbed wire, galv., Pittsburgh	3.05	3.05	3.05	3.20
Barbed wire, galv., Chicago dist. mill	3.10	3.10	3.15	3.25
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	$16.00	$16.75	$17.25	$17.00
Heavy melting steel, Phila	15.00	15.00	15.50	15.50
Heavy melting steel, Ch'go	13.00	13.25	14.25	14.50
Carwheels, Chicago	14.00	14.00	14.00	14.25
Carwheels, Philadelphia	15.50	15.50	16.50	16.50
No. 1 cast, Pittsburgh	15.00	15.00	15.50	14.50
No. 1 cast, Philadelphia	16.00	16.00	16.00	16.25
No. 1 cast, Ch'go (net ton)	13.50	13.50	14.50	15.50
No. 1 RR. wrot., Phila	16.00	16.00	16.00	15.50
No. 1 RR. wrot., Ch'go (net)	12.25	12.50	14.00	13.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.65	$2.65	$2.65	$2.85
Foundry coke, prompt	3.75	3.75	3.75	3.75
Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	16.12½
Electrolytic copper, refinery	17.75	17.75	17.75	15.75
Tin (Straits), New York	39.75	39.37½	41.37½	51.12½
Zinc, East St. Louis	6.25	6.25	6.70	6.25
Zinc, New York	6.60	6.60	7.05	6.60
Lead, St Louis	6.10	6.10	6.70	6.17½
Lead, New York	6.25	6.25	6.90	6.35

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Operations Continue to Decline, Though Tonnage Releases in Some Lines are Improved

PITTSBURGH, Nov. 19.—Although one or two Pittsburgh district steel companies report somewhat better specifications, the general situation has changed very little in the last week, and it cannot be denied that business is very dull. Operations continue their downward trend, with companies in the immediate district running this week at approximately 70 per cent of theoretical capacity. Only two or three of the larger interests which make a diversified line of products are at this or a better rate and much of the steel now being made is going into heavier products.

It is significant, however, that present specifications completely justify the comparatively higher rates of the larger companies. In these cases, the increasing tonnage releases of the railroads, car builders and agricultural implement makers have helped to offset the declining requirements of the automobile industry.

The business of companies which depend on the automotive industry for a considerable part of their tonnage is seriously affected. In the Valleys, the average operating rate is not above 50 per cent, and producers elsewhere which make a preponderance of flat-rolled steel products, are no better off. Strip operations have not been so low in at least two years and the same is true with automobile body sheet mills.

Sheet production in general is somewhat higher this week because of a sharp increase in the schedules of the leading producer, but as the announced operating rate of this company also includes the Chicago district, where rather heavy specifications from the railroad car builders and implement makers have been coming in during the last two weeks, it is doubtful whether the output of Pittsburgh and tributary districts will show any increase.

Tin mills are beginning to feel the effects of usual seasonal betterment. Following the reaffirmation of the present price of $5.35 per base box, Pittsburgh, on 1930 business, specifications are beginning to show improvement, and the tonnage released prior to Nov. 15 for January rolling was encouraging.

Strip makers have opened their books for first quarter at unchanged prices. Although buyers are showing little interest in their requirements for that period, the early price announcement seems to have given the market a slightly stronger tone and has helped to offset the pressure of a few comparatively large buyers for lower prices.

In some cases, sheet makers have failed to withstand this pressure and a little business has been taken at concessions. Lower prices on blue annealed sheets and light plates are now more general. However, the majority of companies are maintaining a comparatively firm price stand and the extent to which they have curtailed operations offers support to their growing belief that little business would be driven in by price concessions. The same is true in the case of the heavy hot-rolled products, on which many companies are doing little to stimulate sales, at least in the way of price inducement. The market on

bars, shapes and plates is still reasonably firm at 1.90c., Pittsburgh.

Well sustained shipments are the feature of a very quiet pig iron market. New buying has been negligible in the last few weeks, but consumers continue to take iron on contract at a satisfactory rate. Merchant producers are translating their reluctance to accumulate iron into curtailment of output and another stack in the Valleys has been banked. This is the third to be blown out or banked in a little more than a week.

The decline in scrap prices is unchecked, and No. 1 heavy melting steel is quotable at 50c. to $1 lower than last week, depending upon the opinion of the dealer or consumer. In the absence of any significant mill buying and with the uncertainty of the market, any quotation is nominal and the same gage must be applied to the declines in other grades of scrap.

Semi-Finished Steel.—Little change in the demand for semi-finished steel is noticeable in this market, although the smaller independent steel companies are curtailing their requirements further. This is particularly true of sheet and strip makers, whose operations in many cases have fallen under 50 per cent of capacity in the last few weeks. The market offers little test for prices, but leading sellers are quoting $35, Pittsburgh or Youngstown, for billets, slabs and sheet bars, and $40 for forging billets. The price is subject to little pressure, as most buyers have enough tonnage under contract to last them the remainder of the year. Wire rods are unchanged at $40 a ton, Pittsburgh or Cleveland, and the market is very dull.

Pig Iron.—In the face of little or no buying of pig iron in the Pittsburgh and Valley districts, shipments this month have held up unusually well, and the leading merchant interest has been moving more iron than it has produced. This is not true in the case of all makers, but it is certain that the pig iron melt in this vicinity has not declined very much in the last few weeks. One exception is the mold foundries, which are operating at a very low rate, but steel foundries serving the railroad equipment makers are growing more active, offsetting decreases elsewhere to a certain extent. The lack of buying may be attributed partly to the present uncertainty of business conditions, but many consumers have their needs over the next few weeks covered by contract and can scarcely be expected to commit themselves further. The price situation is rather uncertain and, in the absence of inquiries for more than 100 to 200 tons, there is nothing to test the present quotations of $18.50, Valley, for foundry and basic iron and $19 for malleable and Bessemer. In the immediate Valley district, these prices seem to be stronger than they are in Pittsburgh, where competition with local furnaces has developed concessions in the past. Merchant producers are apparently determined not to stock pig iron at this time, and, following the blowing out of two merchant stacks in the Valleys last week, the Davison Coke & Iron Co. has banked its Sharpsville furnace. This leaves only three strictly merchant stacks operating in the Valleys and one in Pittsburgh. Steel companies in the Pittsburgh district, which sometimes sell iron, are also said to be considering blowing out furnaces.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district $1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Bars, Shapes and Plates.—Mills are still receiving a fair amount of plate specifications, but not as much can be said for bars and shapes. In the case of bars, mill operations are still being curtailed, while structural shape units are being run at a fairly high level because of the well sustained demand from the large fabricating shops which have heavy backlogs. The bulk of the plate specifications now being released are coming from car builders in this territory, although there is still some demand from barge yards. However, barge requirements will be considerably reduced in a short time unless some orders are booked. A few inquiries are before the trade and more business is under negotiation, but barge lines are slow to take action on additional capacity at this time. Prices are holding at 1.90c., Pittsburgh, but the market can scarcely be called strong at that figure.

Rails and Track Accessories.—Interest in this market is centered at Washington, where the conference of railroad executives, to be followed later in the week by the regular meeting of the American Railway Association in Chicago, is expected to stimulate considerable railroad buying. The New York Central will take bids on Nov. 27 on the track accessories for its recent rail order, but otherwise the market is inactive. The Baltimore & Ohio is not yet inquiring for its rail tonnage, but something is expected from this source in the near future.

Bolts, Nuts and Rivets.—Declining demand from the automobile industry has been offset to some extent by increased business from the railroads, so the bolt and nut industry has been able to maintain a fair operation, that is, approximately 60 per cent of capacity. Jobbers' stocks are not excessive. Prices are holding well.

Wire Products.—Wire makers have opened their books for first quarter, with prices unchanged, and the market is developing a stronger trend at these figures. They are 2.40c. a lb., Pittsburgh, for manufacturers' wire; $2.40 to $2.50 a keg on nails, and 2.55c. to 2.65c. a lb. on annealed fence wire for the jobbing trade. Business is very quiet, but this is seasonal in some lines.

Tubular Goods.—Light demand for pipe and tubular products has not seriously interfered with the operations of mills in this territory, and seamless and lapwelded units are still running at 60 per cent of capacity.

The Iron Age Composite Prices

Finished Steel

Nov. 19, 1929, 2.362c. a Lb.

One week ago	2.362c.
One month ago	2.369c.
One year ago	2.369c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

Nov. 19, 1929, $18.38 a Gross Ton

One week ago	$18.38
One month ago	18.38
One year ago	18.54
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1929	$18.71, May 14;	$18.25, Aug. 27
1928	18.59, Nov. 27;	17.04, July 24
1927	19.71, Jan. 4;	17.54, Nov. 1
1926	21.54, Jan. 5;	19.46, July 13
1925	22.50, Jan. 13;	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
Del'd Philadelphia	2.22c.
Del'd New York	2.24c.
Del'd Cleveland	1.90c.
F.o.b. Cleveland	1.90c.
F.o.b. Lackawanna	2.00c.
F.o.b. Birmingham	2.10c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.05c.
F.o.b. Pittsburgh mills, cut lengths	2.30c.
F.o.b. Birmingham, mill lengths	2.10c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.90c.
F.o.b. Chicago Heights mill	1.95c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.10c.
Del'd Cleveland	2.09c. to 2.14c.
Del'd Philadelphia	2.10c. to 2.15c.
F.o.b. Coatesville	2.00c. to 2.05c.
F.o.b. Sparrows Point	2.00c. to 2.05c.
F.o.b. Lackawanna	2.00c. to 2.05c.
Del'd New York	2.17½c. to 2.22½c.
C.i.f. Pacific ports	2.25c. to 2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.10c.
F.o.b. Lackawanna	2.00c. to 2.05c.
F.o.b. Bethlehem	1.95c. to 2.00c.
Del'd Cleveland	2.09c. to 2.14c.
Del'd Philadelphia	1.96c. to 2.06c.
Del'd New York	2.04½c. to 2.14¼c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	2.00c.
Wider than 6 in., P'gh	1.90c.
6 in. and narrower, Chicago	2.10c.
Wider than 6 in., Chicago	2.00c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.20c.
Bars, f.o.b. Chicago	2.20c.
Bars, Cleveland	2.20c.
Bars, Buffalo	2.20c.
Shafting, ground, f.o.b. mill	*2.55c. to 3.50c.
Strips, P'gh	2.75c.
Strips, Cleveland	2.75c.
Strips, del'd Chicago	3.05c.
Strips, Worcester	2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland, to jobbers and retailers.)

	Base per Keg
Wire nails	$2.40 to $2.50
Galvanized nails	4.40 to 4.50
Galvanized staples	3.10 to 3.20
Polished staples (per lb.)	2.85c. to 2.95c.
Cement coated nails	$2.40 to $2.50

	Base per 100 Lb.
Bright hard wire, No. 6 to No. 9 gage, to manufacturing trade	$2.40
Annealed fence wire	2.55 to 2.65
Spring wire	3.50 to 3.60
Galv'd wire, No. 9	3.00 to 3.10
Barbed wire, galv'd	3.05c. to 3.15c.
Barbed wire, painted	2.80c. to 2.90c.
Woven wire fence (per net ton to retailers)	$65.00

(Carload lots f.o.b. Chicago.)

Wire nails	$2.45 to $2.55 (keg)
Bright hard wire to manufacturing trade	2.45c. (lb.)
Annealed fence wire	2.60c. to 2.70c.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.45c.
No. 13, del'd Philadelphia	2.57c. to 2.67c.
No. 13, blue annealed, B'ham	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.75c.
No. 24, f.o.b. Chicago dist. mill	2.85c.
No. 24, del'd Philadelphia	3.07c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.00c. to 4.10c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.40c. to 3.50c.
No. 24, f.o.b. Chicago dist. mill	3.50c. to 3.60c.
No. 24, del'd Cleveland	3.59c. to 3.69c.
No. 24, del'd Philadelphia	3.72c. to 3.82c.
No. 24, f.o.b. Birmingham	3.75c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	4.00c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.90c. to 4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.35
Standard cokes, f.o.b. Gary	5.45

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. to 2.75c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(½% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

¼	41	24½	¼ and ⅜	+13	+48
½ to ⅝	47	30½	½	23	7
½	53	42½	¾	28	12
¾	58	47½	1 to 2	34	18
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	½	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Buttweld operations are not quite so high, but have not slumped off as much as might be expected at this time of the year. Some oil companies have inquiries out for seamless goods, but are slow to take action on these projects. Shipments of mechanical tubing this month are considerably behind those of October, but boiler tubes have held up.

Cold-Finished Steel Bars.—Business is very quiet, with automotive demand practically negligible, and other consuming lines taking material at a moderate rate. Cold-finished steel makers have low inventories and have been able to keep their stocks of steel in line with finishing mill requirements. The price of 2.20c., Pittsburgh, is not subject to question.

Sheets.—Specifications were heavier last week with most of the larger companies and some new business was taken. A large part of this tonnage came from railroad car builders and farm implement makers. Automobile tonnage showed little improvement. Demand for metal furniture sheets is still fairly good and electrical sheets continue active. Operations are rather spotty, particularly in the Valleys, where only about 40 per cent of the available mills were rolling last week. The figure is slightly higher this week, and the country's leading sheet maker, whose operations were well under 70 per cent last week, has scheduled its mills at a considerably better rate this week. In contrast to this, one large Valley interest is practically idle, and the average for the industry is not above 60 per cent. No marked improvement is expected before the first of the year, but many believe that the low point has about been reached. Prices are still very weak. The leading interest has opened its books for the first quarter on tin mill black plate, reaffirming the present quotation of 3c., Pittsburgh, although the market is still quotable at 2.90c. to 3c. Galvanized sheets are now rather generally being sold at 3.40c., Pittsburgh, although some mills continue to quote 3.50c. Black sheets are holding in this territory at 2.75c., but lower quotations have come out in a few cases. Some makers are being forced to recognize shading on blue annealed sheets and light plates, and the jobbing mill product is now quotable at 2.10c. to 2.20c., Pittsburgh, and 2.25c. to 2.35c. for the No. 10 and No. 13 gage respectively. Even the minimums of these ranges are not effective in taking business against competition of the wide strip mills.

Tin Plate.—The American Sheet & Tin Plate Co. has opened its books for 1930, reaffirming the present price on standard coke tin plate of $5.35 a base box, Pittsburgh. Leading independents generally have taken the same action. The last week brought better specifications, as material for January rolling is expected to be released before the 15th of the second month preceding, and one large maker reported the heaviest specifications for any week since July. Operations have not been stepped up very much, although improvement is assured next month.

Strip Steel.—Leading makers of strip steel have opened their books for the first quarter with prices unchanged at 1.90c. and 2c., Pittsburgh, for hot-rolled material and 2.75c., Pittsburgh or Cleveland, on cold-rolled in carload lots or more. For less than carload lots, the price is 2.85c. In a few cases, makers have had an opportunity to quote on first quarter business, but the great majority of users are showing little interest in their requirements for that time. However, the price announcement has given the market a slightly stronger tone. Specifications are very light, but in a few cases new orders are reported as somewhat better this week. Hot-rolling mills capacity, but cold-rolling units are are engaged at about 40 per cent of not even this busy, and the average for the strip industry as a whole is below 40 per cent.

Coal and Coke.—Furnace coke is weaker, but, in view of the fact that demand is not expected to improve until after the first of the year, curtailment in production is likely in an effort to maintain prices at present levels. The $2.65 to $2.75, Connellsville, quotations now in effect, are said to allow a very small margin of profit. Foundry coke demand is also light, and prices are very weak. Even the premium brands are subject to considerable pressure, but most makers continue to quote $3.85, ovens. Demand for coal is only fair, as the weather is not yet cold enough to stimulate sales of the domestic grades, and industrial consumption is declining in this district.

Old Material. — Further weakness has developed in the scrap market, and, although today's quotations must be considered as only nominal, No. 1 heavy melting steel is quotable at 50c. to $1 a ton less than it was last week. A small tonnage was sold to a local steel company last week at $15.50, while a sale of strictly railroad steel was reported at $16.50. In view of this, the market seems quotable between those figures, with an average of $16 and a net decline of 75c. from last week. However, this figure is so indefinite that it is hard to determine whether a dealer would be willing to sell a large tonnage at this figure, while it is certain that no mill is willing to buy. Hold-ups are in effect at a number of principal consuming points and others are definitely limiting shipments. With no prospect of increase in steel plant operations until at least the first of the year, there is nothing to bring out scrap purchases, and consequently little to bolster the market. Hydraulic compressed sheets are nominally quotable on the same basis as the heavy melting grade, and declines are recognized on nearly all the other items. Specialties have held better than other grades because of the comparatively good operating rates of steel foundries, but the blast furnace grades are off this week as a result of curtailed shipment to principal consuming points.

Warehouse prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.80c. to 3.90c.
Galv. sheets (No. 24), 25 or more bundles	4.45c. to 4.55c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.35c. to 3.45c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.50c. to 3.60c.
Galv. corrug. sheets (No. 28), per square	$4.43
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd base per 100 lb	$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per keg	2.80 to 2.90
Cement coated nails, per keg	2.95 to 3.05

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$15.50 to $16.50
No. 2 heavy melting steel	13.50 to 14.00
Scrap rails	14.50 to 15.00
Compressed sheet steel	15.50 to 16.00
Bundled sheets, sides and ends	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
Sheet bar crops, ordinary	17.50 to 18.00
Heavy breakable cast	11.00 to 11.50
No. 2 railroad wrought	15.50 to 16.50
Hvy. steel axle turnings	15.00 to 15.50
Machine shop turnings	10.50 to 11.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	19.50 to 20.50
Railr. coil and leaf springs	19.50 to 20.50
Rolled steel wheels	19.50 to 20.50
Low phos. billet and bloom ends	20.50 to 21.00
Low phos., mill plates	20.50 to 21.00
Low phos., light grades	19.50 to 20.50
Low phos., sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	15.00 to 15.50
Electric Furnace Grades:	
Low phos., punchings	18.50 to 19.00
Hvy. steel axle turnings	15.00 to 15.50
Blast Furnace Grades:	
Short shoveling steel turnings	11.00 to 11.50
Short mixed borings and turnings	11.00 to 11.50
Cast iron borings	11.00 to 11.50
Rolling Mill Grades:	
Steel car axles	20.00 to 21.00
Cupola Grades:	
No. 1 cast	14.50 to 15.50
Rails 3 ft. and under	17.50 to 18.50

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$35.00
Rerolling, 4-in. and under 10-in., Youngstown	35.00
Rerolling, 4-in. and under 10-in., Cleveland	35.00
Rerolling, 4-in. and under 10-in., Chicago	37.00
Forging quality, Pittsburgh	40.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$35.00
Youngstown	35.00
Cleveland	35.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$40.00
Cleveland	40.00
Chicago	41.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$15.50 to $16.50

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.65 to $2.75
Foundry, f.o.b. Connellsville prompt	3.75 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

Per Gross Ton Furnace		Per Gross Ton Furnace	
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$22.00 to $23.00	10%	$26.00 to $28.00
7%	23.00 to 24.00	11%	28.00 to 30.00
8%	24.00 to 25.00	12%	30.00 to 32.00
9%	25.00 to 26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd	$1.40 to $1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.25 to 18.75
Domestic, No. 1 ground bulk, 96 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ⅛ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh.	75, 20, 10 and 5
Stove bolts in packages, Chicago.	75, 20, 10 and 5
Stove bolts in packages, Cleveland.	75, 20, 10 and 5
Stove bolts in bulk, P'gh.	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago.	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland.	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened,	80 and 5
Milled headless set screws, cut thread.	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

Western Steel Industry Senses a Return of Confidence—Miscellaneous Orders Gain—Rail Tonnage Heavy

CHICAGO, Nov. 19.—Foremost among developments in the Chicago iron and steel market is a clear indication that confidence is returning to business as a whole. A week ago little could be said of specifications and new purchases outside of the needs of railroads and car builders. In the past week this situation has changed and, without taking into account rail business, releases for finished steel have again reached a volume closely matching current ingot output, which stands at 75 per cent of capacity.

New orders are individually small and the pressure for immediate delivery is insistent, giving indication of the condition of stocks in the hands of users. There is also the fact that many buyers, having been too cautious in recent weeks, now find that their supplies of steel are inadequate for immediate needs.

The impulse to speed production is being felt in several industries. Farm implement manufacturers are entering into a higher rate of production on tractors and are putting new schedules in operation for the manufacture of combines. Automobile frame makers are sending in larger specifications for hot-rolled strips, and automobile and parts manufacturers are finding slightly greater needs for alloy steel bars. The award of a new gas line for a California company and releases against line pipe contracts, which were temporarily suspended several weeks ago, are bringing large buyers of plates into the market, and the effect on plate shipments is already noticeable. Specifications for car material are heavy, and there is a growing impression that car shops are preparing to expand output in anticipation that equipment purchases will be in good volume after the turn of the year.

Several large industrial plants, which closed down soon after the collapse in the stock market, have resumed operations on scales ranging from 40 to 60 per cent of capacity.

Bolts, Nuts and Rivets.—Some improvement is noted in specifications from automobile manufacturers. Shipments to car builders, the railroads and farm implement makers are steady.

Ferroalloys.—Several contracts for ferromanganese for future delivery have been closed at $105 a ton, seaboard. Clauses protecting buyers against declines in prices are being attached. It is reported here that contracts for 50 per cent ferrosilicon will not be offered to consumers until late in December. The spiegeleisen market is quiet except for spot orders of small size, which bring $34 a ton, Hazard, Pa.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $88.50; spiegeleisen, 19 to 21 per cent, $39.76 to $41.76.

Pig Iron.—Shipments of Northern foundry iron about equal the output of merchant stacks, though there has been some redistribution of tonnage in recent days. Iron not being taken by industries adversely affected by business conditions is readily being absorbed by manufacturing plants which have larger orders on hand. Farm implement manufacturers are drawing more heavily against contracts for pig iron, and railroad equipment makers are taking larger shipments. Several orders from automobile plants that until recently were marked for indefinite suspension have been changed to releases for delivery about Dec. 1. A cargo of pig iron has been unloaded at a Chicago dock and another boat-load is expected in a few days. The Southern iron market is quiet, with quotations ranging from $13 to $14 a ton, Birmingham.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil.	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	$19.01 to 19.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Sheets.—New business continues to taper, and prices are giving ground. Galvanized sheets are now quotable at 3.50c. to 3.60c. a lb., Gary, and black sheets at 2.85c. Output ranges from 60 to 70 per cent of capacity at local hot mills, and schedules are not complete for a week in advance. A part of the slowing down in demand can be attributed to a customary seasonable lull, but it is also partly the result of extreme caution on the part of many consumers. Stocks in the hands of buyers are small, and mills are being pressed for prompt deliveries on numerous small orders.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	1.90c. to 2.25c.
Reinforc'g bars, rail steel	1.85c. to 2.00c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (⅞ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅝ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	$2.75 to $2.95
Cement c't'd nails, base per keg	2.75 to 2.95

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.90c.; No. 24 galv., 3.55c. to 3.65c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Cast Iron Pipe.—New business and fresh inquiry are very quiet. The outlook, however, is not wholly discouraging in view of the fact that this is usually a dull season and that much work held in abeyance this year is being considered for 1930. On this score, sellers are hopeful that public work will revive near the end of this year. Genoa, Neb., has ordered 180 tons of 8-in. pipe from the Central Foundry Co. Royal Oak, Mich., is in the market for 100 tons of 8-in. pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $43.70 to $45.70; 4-in., $47.70 to $49.70; Class A and gas pipe, $3 extra.

Structural Material.—This market remains quiet in the immediate vicinity of Chicago. In outlying centers, especially at Milwaukee, fabricators are comfortably booked. Many sizable projects are talked of for Chicago, but the trade has little expectation that steel prices will be asked before the turn of the year. The Illinois Steel Co.'s expansion program is making steady progress and plans for several buildings are now in the shop. Several public utility projects, including a large power house addition at Waukegan, Ill., are rapidly taking shape. The aggregate tonnage of steel for highway bridges is large and many Western States are planning sizable bridge programs for the coming year. New railroad work is moderately active, but individual requests for prices are for small tonnages, usually about 25 to 75 tons each.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Rails and Track Supplies.—New orders for standard-section rails total more than 100,000 tons, the bulk of which will be rolled by Chicago mills. The Rock Island has placed 39,200 tons with the Illinois Steel Co., 11,000 tons with the Colorado company and 6900 tons with the Inland Steel Co. The Illinois Central has ordered 25,000 tons from the Tennessee company, 10,000 tons from Inland and 5000 tons from Illinois. Of the 23,000 tons placed by the Wabash a week ago, about two-thirds will be rolled at Chicago. Chicago producers estimate that for the country as a whole about 1,500,000 tons of rails has been ordered for 1930 programs. It is estimated that somewhat more than 750,000 tons still remains to be placed. The bulk of the

tonnage normally expected from Western railroads is already on the books of producers, there being miscellaneous lots aggregating about 80,000 tons which may be placed in the next few weeks. Releases against new contracts are larger, and standard-section rail output is now close to 85 per cent of capacity. Demand for light rails is more active, but the bulk of tonnage is for use in anthracite coal fields and orders are being placed with mills to the east of Chicago. Miscellaneous orders for track supplies total 15,000 tons, a large part of which is to accompany shipments of rails on new contracts. Inquiry for these commodities is turning upward, and requests for prices total 25,000 tons.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Bars.—Demand for soft steel bars has come back sharply after dragging for several weeks. Specifications for the week are fully equal to shipments, which represent about 75 per cent of local bar mill capacity. Farm implement manufacturers account for a large share of the increase as they step up production on tractors and tillage machinery and start output of combines, which are to be delivered in the early part of the new year. The price of soft steel bars remains steady at 2c. a lb., Chicago. There is a steady use of iron bars by car builders and the railroads, and output is at a good fall rate. The price is well established at 2c. a lb., Chicago. Specifications for alloy steel bars are a trifle heavier, and it is interesting that a fair part of this change is due to larger needs by automobile manufacturers. Output in this district is close to 60 per cent of capacity. Shipments of rail steel bars are lighter, as barn equipment manufacturers come to the end of their busy season. Output has been adjusted downward by shortening hours rather than a change from the practice of double turn operation. Demand for fence posts is seasonably dull.

Hot-Rolled Strips.—Quotations in this market are on the basis of 2c. a lb., Chicago, for strips wider than 6 in., and 2.10c. for strips 6 in. and narrower. Demand from most users remains at the low level of recent weeks, but encouragement comes from manufacturers of automobile frames, which now are making schedules for increased deliveries in December.

Cold-Rolled Strips.—Prices in this district remain on the basis of 2.75c. a lb., Cleveland, or 3.05c., delivered Chicago. Interest on the part of consumers is lacking and output is low.

Wire Products.—Changes in this market in the past week have been confined to slight shifts of demand from one commodity to another, with the aggregate tonnage of all wire products remaining practically unchanged. New orders from the jobbers are spotty, some sections of the country showing increases while in other sections needs are lighter. Producers are looking for smaller shipments to distributers as the inventory period approaches. No change is reported in the rate of consumption by the manufacturing trade. Prices for plain wire remain steady at 2.45c. a lb. The slow pace of the building industry is reflected in light demand for nails. Producers are attempting to hold local prices at $2.45 a 100-lb. keg and are meeting with success in the absence of large orders such as would give satisfactory tests of prices. Wire mill output is holding in the range of 55 to 60 per cent of capacity.

Plates. — Increased specifications from car builders reflect, according to sellers of plates, the thought that car building programs will be put through without hesitation and that car builders are anticipating a substantial rate of operations in the first part of the new year. Tank building programs are less active than in October. One new inquiry from the Southwest is for 2500 tons and one order from that territory is for 400 tons. Old projects that at this time are dormant afford the only indication of what oil producers have in mind in the way of new construction if business conditions warrant expansion of facilities. The Milwaukee pipe manufacturer is reported to have taken a contract for a round tonnage of gas pipe for a Pacific Coast company. This tonnage, which is for immediate shipment, and releases against old contracts are serving to stimulate the local plate market. Although production of most sizes of plates is not at the rate of early October, the outlook for this commodity, for oil field and car use especially, is promising. Prices at Chicago are steady at 2c. a lb.

Reinforcing Bars.—New orders for reinforcing bars are scarce, and shop backlogs have been reduced to the point where within a week or 10 days output will of necessity be reduced. The total volume of quotations up for consideration is impressive, but there is no indication that contracts will be placed in satisfactory volume in the near future. An encouraging feature of the market is that recent lettings of small tonnages reflect a strengthening in prices, in some cases as much as $2 a ton. However, tests on attractive business are lacking, and therefore it cannot be assumed the general price level is above that of a week ago. The only award of note this week is for 450 tons for buildings at Illinois State institutions.

Coke.—Contracting for 1930 is under way at $8 a ton, f.o.b. local ovens. Delivered price in Chicago for by-product foundry coke is $8.75 a ton. Shipments are at the rate of local oven capacity.

Old Material.—Prices continue to sag as demand wanes and those who have accumulated scrap try to place it in the market. Close to 10,000 tons of heavy melting steel has been taken by a local mill at $13.50 a gross ton, delivered, a reduction of 25c. a ton since the last large sale to a consumer. Brokers are being offered tonnages freely at 50c. to 75c. a ton below this figure. It is rather commonly believed that most large consumers have comfortable stocks on hand and that restricted shipments closely represent current needs as buyers unload from cars to furnaces. Although some in the trade look to winter weather to check the flow of new scrap and tend to steady the market, there are many who look for light trading throughout the remainder of the year and for lower prices. Some resistance to low prices has developed among producers of scrap who threaten to accumulate this commodity rather than sell it at prevailing quotations. On the other hand, many yard dealers, both local and in the country, are trying to press sales rather than let their yards freeze in for the winter or operate at high cost in cold weather.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	$13.00 to $13.50
Shoveling steel	13.00 to 13.50
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.25 to 11.75
Drop forge flashings	10.75 to 11.25
No. 1 busheling	11.50 to 12.00
Forg'd cast and r'l'd steel carwheels	17.75 to 18.25
Railroad tires, charg. box size	18.00 to 18.50
Railroad leaf springs cut apart	18.00 to 18.50
Acid Open-Hearth Grades:	
Steel couplers and knuckles	16.50 to 17.00
Coil springs	19.00 to 19.50
Electric Furnace Grades:	
Axle turnings	12.75 to 13.25
Low phos. punchings	15.25 to 15.75
Low phos. plates, 12 in. and under	15.25 to 15.75
Blast Furnace Grades:	
Axle turnings	11.50 to 12.00
Cast iron borings	9.25 to 9.75
Short shoveling turnings	9.50 to 10.00
Machine shop turnings	7.00 to 7.50
Rolling Mill Grades:	
Iron rails	14.50 to 15.00
Rerolling rails	15.50 to 16.00
Cupola Grades:	
Steel rails less than 3 ft.	16.50 to 17.50
Steel rails less than 2 ft.	18.50 to 19.00
Angle bars, steel	16.25 to 16.75
Cast iron carwheels	14.00 to 14.50
Malleable Grades:	
Railroad	16.50 to 17.00
Agricultural	14.50 to 15.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	17.50 to 18.00
Iron car axles	25.50 to 26.00
Steel car axles	16.00 to 16.50
No. 1 railroad wrought	12.25 to 12.75
No. 2 railroad wrought	11.50 to 12.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	14.50 to 15.00
Pipes and flues	9.50 to 10.00
Cupola Grades:	
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	12.50 to 13.00
No. 1 agricultural cast	12.00 to 12.50
Stove plate	11.75 to 12.25
Grate bars	11.25 to 11.75
Brake shoes	10.25 to 10.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

New York

Structural Steel Lettings in District 18,000 Tons—Prices Weaker—Pig Iron Buying Light

NEW YORK, Nov. 19.—Pig iron buying is exceedingly light, amounting to only 3000 tons for the week, but sentiment in the trade has improved. Suspensions of shipments have been negligible and in the past few days pressure for deliveries has increased, suggesting that foundries are getting over the effects of the stock market scare. Melters have very little iron on their yards, but they are not disposed to buy ahead. Business pending before the trade does not exceed 3000 tons, which is largely accounted for by two inquiries. The Worthington Pump & Machinery Corporation is in the market for 365 tons of Bessemer and 650 tons of malleable or No. 1X for its Harrison, N. J., plant for deliveries extending from December into the first quarter, and the New York Air Brake Co. wants 400 tons of malleable and 250 tons of foundry for shipment over a similar period to its Watertown, N. Y., works. Stocks on blast furnace yards are still relatively low, and at least one important merchant interest plans to blow out capacity if melt shows material curtailment. Prices, however, are showing the strain of a quiet market. On Buffalo foundry iron, $17.50, base furnace, is a general quotation and remains to be tested on an attractive tonnage. Eastern Pennsylvania foundry iron is more readily available at $18.50, base furnace, and this price was shaded in one important recent transaction. Prices on Alabama iron are uncertain in view of its inactivity in this market. However, Buffalo furnaces are prepared to meet a renewal of Southern competition, having accumulated stocks of barge-borne iron at New Jersey ports. Barge iron is still moving on the State canal, but the season of navigation will close in a week or two.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$22.41
*Buf. No. 2, del'd east. N. J.	20.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	$19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Finished Steel.—Although some local steel sales offices find encouragement in the fact that orders in the past week have been slightly better than in the preceding week, other offices have suffered a loss in business. On the whole, the volume is probably no less, but gains in one direction are offset by a slowing up in others. Business in bars, sheets and strip is noticeably light, but in structural shapes and plates it is fairly good, while the past week has brought a fairly substantial tonnage in tin plate on contract, following the reaffirmation of the current price of $5.35 a base box. Price developments otherwise are toward weakness. The structural steel market locally is subject to keener competition, and quotations on plain material are lower. The usual range is 2.04½c. to 2.14½c. a lb., delivered, New York, but the bottom price has been shaded on large jobs. The maximum price, obtainable only on ordinary lots, is usually 2.14½c. While all of the larger producers of soft steel bars are maintaining a quotation of 1.90c., Pittsburgh, some outside competition has developed at prices which figure back to 1.85c., Pittsburgh. Blue annealed sheets have definitely settled to 2.25c., Pittsburgh, for No. 13 gage and to 2.10c. for No. 10 gage. Some jobbing mills are now recognizing these prices on desirable orders, though $1 or $2 higher is frequently quoted on small lots. Railroad equipment and building construction still offer the most encouraging prospects for nearby bookings of tonnage lots. Structural steel lettings in the New York district during the week, at 18,000 tons, compared favorably with those of any recent week. The largest award, 12,300 tons, for a subway section in Brooklyn, went to the American Bridge Co. Although a fair amount of structural work is pending, some projects now on the architects' boards are not being put out for bids until the industrial situation and the mortgage money market have become clarified. The railroad equipment market is stimulated by the expectation that the Chesapeake & Ohio and the Pere Marquette railroads will shortly come into the market for 10,000 cars and the probability that the New York Central will announce a program calling for the purchase of about 15,000 cars for 1930 delivery. Following the conference of railroad executives with President Hoover on Tuesday and the meeting of the American Railway Association in Chicago on Friday, it is expected that the equipment purchasing programs of the railroads will be accelerated. In addition to about 15,000 cars now pending, it is expected that inquiries will soon come into the market for 40,000 to 50,000.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.17½c. to 2.22½c.; structural shapes, 2.04½c. to 2.14½c.; bar iron, 2.14c.

Cast Iron Pipe.—The usual buying at this season of gas pipe for spring delivery has not yet developed, and municipal business continues light. The Federal Water Service Corporation, New York, is in the market for about 300 tons of water pipe for Girard, Ohio, and 500 tons for Salem, Ore. Prices continue irregular, ranging from $31 to $34 a ton, f.o.b. foundry. Northern producers are still fairly well engaged on large sizes of pipe, but Birmingham foundries are at low operating rates and are in need of business, as stocks on their yards are increasing.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $34.60 to $36.60; 4-in. and 5-in., $37.60 to $39.60; 3-in., $44.60 to $46.60. Class A and gas pipe $3 extra.

Warehouse Business.—Cold-finished shafting and screw stock has been reduced by jobbers $2 a ton to 3.50c. a lb. for rounds and hexagons and 4c. a

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.50c.
Flats and squares	4.00c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.50c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut threads:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10

	Per 100 Ft.
Boiler Tubes—	
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
⅛-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
⅛-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 x 20 in.)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 x 20 in.)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.70c.
No. 22	3.85c.
No. 24	3.90c.
No. 26	4.00c.
No. 28*	4.15c.
No. 30	4.40c.

Sheets, Galvanized

	Per Lb.
No. 14	4.15c.
No. 16	4.00c.
No. 18	4.15c.
No. 20	4.25c.
No. 22	4.35c.
No. 24	4.50c.
No. 26	4.75c.
No. 28*	5.00c.
No. 30	5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

lb. for flats and squares. Effective Nov. 15, black sheets have been reduced $2 a ton to 3.90c. a lb., base, and galvanized sheets $5 a ton to 4.50c. a lb., base. Orders continue in good volume, but are individually small, so that the month is not expected to prove so satisfactory as October.

Coke.—Producers of beehive foundry coke have opened their books for first quarter and first half contracts. The price is unchanged at $4.85 a net ton, ovens, for special brands, or $8.56, delivered to northern New Jersay, Jersey City and Newark, and $9.44 to New York and Brooklyn. Standard furnace coke is quiet, with the usual quotation $2.75 a net ton, Connellsville, but distress carloads are occasionally going at $2.65 to $2.70 a ton. By-product foundry coke is quoted at $9 to $9.40 a net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Reinforcing Bars.—The volume of small-lot buying has diminished somewhat in the past week, largely on account of seasonal conditions. Although sales are falling considerably behind those of October, they are about on a par with those in November of last year. Prices are fairly steady at 2.05c., New York.

Old Material.—Consumer buying of scrap continues limited. Brokers with contracts report a good supply of old material at present buying prices. No. 1 heavy melting steel is quoted at $14.50 a ton, delivered eastern Pennsylvania. The buying price of No. 2 heavy melting steel, delivered to Phoenixville or Harrisburg, Pa., has been reduced to $12.50 a ton, a decline of 50c. The consumer of No. 2 automobile steel at Pencoyd, Pa., has placed some small tonnages with brokers at $13.75 a ton, delivered. Steel car axles have declined $1 a ton on the basis of a recent sale at $20 a ton, delivered, on a freight rate of $3.78 a ton, the broker offering $15.75 a ton, delivered, to fill the order.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$11.00 to $11.85
Heavy melting steel (yard)	8.00 to 9.00
No. 1 hvy. breakable cast.	10.25 to 11.00
Stove plate (steel works)	8.00
Locomotive grate bars	8.25
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	7.25 to 7.50
Cast borings (blast fur. or steel works)	7.00 to 7.50
Mixed borings and turnings	6.75 to 7.50
Steel car axles	15.75 to 16.75
Iron car axles	22.00 to 22.50
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.75
Forge fire	8.50 to 9.00
No. 1 railroad wrought	12.00 to 12.50
No. 1 yard wrought, long	11.00 to 11.50
Rails for rolling	12.00 to 12.50
Stove plate (foundry)	8.25 to 9.00
Malleable cast (railroad)	13.50 to 14.00
Cast borings (chemical)	9.00 to 9.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$15.50 to $16.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.50 to 14.00
No. 2 cast (radiators, cast boilers, etc.)	13.00 to 13.50

Cleveland

Automobile Industry Curtails Further But Ford Is Expected to Release Orders Soon for New Program

CLEVELAND, Nov. 19.—A further curtailment of the automotive industry is in prospect as two or three motor car manufacturers in Detroit are scheduled to close down Nov. 23 for inventory. The Ford Motor Car Co. has sharply curtailed operations preparatory to starting on its new models, and has cut off shipments from some of its parts makers and automobile body plants. However, it is understood that the Ford company plans to get under production on its new cars as quickly as possible and will shortly release some good-sized orders for sheets and other mill products. Two or three of the Detroit automobile plants making higher-priced cars are under good production on new models. However, the industry as a whole is not expected to show much of a pick-up until after the automobile shows.

Building work is light, but lower interest rates are expected to stimulate activity. The first inquiry for steel for the Cincinnati Union Terminals project has come into the market. It is stated that this development will require 40,000 tons of steel.

The volume of business in finished steel continues very light. There has been a further reduction in operations by some of the finishing mills that are particularly affected by the lack of a demand by the automotive industry and a rather sharp curtailment in ingot production in this territory. While a few sheet mills increased operations this week, the aggregate output by sheet and strip mills has been further reduced. Some new business in steel bars, plates and structural shapes was placed by consumers whose stocks have become depleted. However, buying is of a cautious character for early shipment.

While business in most lines outside the automotive industry has slowed down, it is still fair, and orders entered by some of the mills making the heavier rolled products have been as good so far this month as during the corresponding period of October. Agricultural implement manufacturers continue to operate well.

Present prices on black and automobile body sheets and hot and cold-rolled strip steel have been reaffirmed by some of the mills for the first quarter.

Scrap prices are weak and shipments have been quite generally suspended by Cleveland and Valley district mills. The last cargo of boat scrap to be sent from Detroit to Cleveland this season was shipped during the week.

Pig Iron.—A few small-lot sales of foundry iron for the first quarter totaling 1000 tons were sold by one Lake furnace interest during the week at the current prices. The market continues rather quiet, buying for the most part being of a hand-to-mouth character. Sales by Cleveland interests during the week aggregated 10,500 tons. These included a cargo of boat iron for shipment to Chicago before the close of the season of navigation. Shipments during the first half of November were about the same as in the corresponding period of October, but a falling off is looked for during the remainder of the month. While a few foundries in the automotive industry are taking a little more iron than last month, the total shipments to that industry show no gain. There has been some further slowing down of operations by jobbing foundries in the northern Ohio territory. Prices are unchanged at $18.50, Cleveland, for out-of-town shipment and $19, furnace, for local delivery. New weakness has developed in Southern iron, which is now being offered at $13.50 to $14, Birmingham, and these prices are being named for first quarter delivery.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$19.50
S'th'n fdy., sil. 1.75 to 2.25	$19.50 to 20.50
Malleable	19.50
Ohio silvery, 8 per cent	28.00
Basic Valley furnace	18.50
Stand. low phos., Valley	26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Semi-Finished Steel.—A local mill was given a 1000-ton release of slabs during the week, but aside from this spurt specifications continue light. The leading local producer is still operating eight of its 14 open-hearth furnaces, but is running from hand to mouth. There is no new inquiry. Shipments are being made against contracts at the quoted prices.

Strip Steel.—A Cleveland mill has opened its books for the first quarter at the current prices of 1.90c., Pittsburgh, for hot-rolled wide strip and 2c. for narrow, and 2.75c., Cleveland and Pittsburgh, for cold-rolled strip and 4.25c. for fender stock. A few inquiries have come out for that delivery from consumers in the automotive field that evidently are planning to line up their requirements with a

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

view of getting under production on new models in January. Current orders continue very light, and the tendency in mill operations was downward during the week. Although all mills are in need of business, there seems to be little disposition to shade regular quotations.

Bars, Plates and Shapes.—Structural shapes are in fair demand, largely from small fabricating shops that are well filled with work. The largest local award during the week was 800 tons for a building for the Grasselli Chemical Co. The assembly plant for the Ford Motor Co. at Edgewater, N. J., requiring 6500 tons, was placed in Detroit. Plates are not moving so well as recently, but small-lot inquiry has improved. Bars are dull and local mills need orders. Weakness is still in evidence in the local bar market, with quotations of 1.85c., Cleveland, or lower. However, outside mills generally are holding to 1.90c., Cleveland. Structural shapes and plates are firm at 1.90c., Pittsburgh, with small lots bringing 1.95c. The higher price is being well maintained on boiler plates.

Sheets. — Present regular quotations of 2.75c. on black and 4c. on auto body sheets have been reaffirmed for the first quarter by two or three mills. While conditions do not indicate any urgency in placing contracts, some consumers in the automotive field have shown interest in what the prices will be for the quarter and some business in auto body sheets for January shipment will probably be placed within the next two weeks. Current demand continues very dull. While a few fair-sized releases came from the automotive industry during the week, enabling a few mills to increase operations, aggregate orders from this industry are still very light. Demand from other consumers has slowed down and is confined to small lots. The market is weak. A local inquiry for 1500 tons of black sheets in various finishes and metal furniture sheets for electric refrigerators brought out rather sharp concessions and only 280 tons was placed. On blue annealed sheets, prices of 2.10c., Pittsburgh, for No. 10 and 2.25c. for No. 13 have become rather common. On black sheets, 2.75c. seems to be holding on most small lots. Galvanized sheets range from 3.40c. to 3.50c., the lower price having become more general. Metal furniture sheets appear to have settled to 4c., and it is reported that this price has been shaded.

Wire Products.—Nails are moving slightly better than recently. The price situation is regarded as somewhat improved, the $2.40 per keg price to jobbers now being maintained in this territory. Bolt wire is in light demand because of the inactivity of the automotive industry. Wire prices are well maintained.

Warehouse Business. — Jobbers' sales have shown a rather steady decline this month in practically all products, business having been affected both by the slowing down of manufacturing industries and by the ability of buyers to secure prompt mill shipments. Prices are firm.

Coke.—Domestic coke is moving only moderately well, as weather conditions have not stimulated consumer demand. The market lacks firmness and one Valley producer which recently advanced to $5.25 for the egg size has reduced its price to $5. Connellsville heating coke ranges from $2.75 to $3. Foundry coke is quiet and prices are unchanged. Ohio by-product foundry coke is quoted at $8.25, ovens.

Old Material.—In the absence of any demand to support the market, prices here declined 50c. a ton or more on heavy melting steel, compressed sheet steel, machine shop turnings and blast furnace grades. The market has a weak tone and there is considerable uncertainty as to what prices would be quoted should an inquiry come out of sufficient size to furnish a test. Shipments to local mills are still suspended, with the exception of a small quantity that is being taken by one consumer, and shipments have been held up in the Valley district. Most consumers have large stocks.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$14.00 to $14.50
No. 2 heavy melting steel	13.50 to 13.75
Compressed sheet steel	14.00 to 14.50
Light bundled sheet stampings	12.00 to 12.50
Drop forge flashings	12.00 to 12.50
Machine shop turnings	9.00 to 9.75
Short shoveling turnings	11.50 to 12.00
No. 1 railroad wrought	13.50 to 14.00
No. 2 railroad wrought	16.00 to 16.50
No. 1 busheling	13.25 to 13.75
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	10.00 to 10.50
Mixed borings and short turnings	10.00 to 10.50
No. 2 busheling	10.00 to 10.50
Cupola Grades:	
No. 1 cast	17.00 to 17.50
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅜-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.90c.
†Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Philadelphia

Steel Orders Small and Prices Lack Firmness—Boston & Maine Places Rails—Scrap Weak

PHILADELPHIA, Nov. 19.—The cautious attitude of buyers following the recent decline in the stock market is apparently relaxing and steel mills are beginning to receive some inquiries for early requirements. Actual business, however, is confined to small orders, fairly well distributed in the various consuming fields. Steel prices still lack firmness, and sellers are inclined to grant concessions on desirable tonnages of plates, shapes or sheets.

Shipyards look forward to continued active operation, with a number of ocean ships in prospect from the award of Government mail-carrying contracts.

The Boston & Maine Railroad has placed 10,000 tons of 100 and 130-lb. rails for next year's requirements with the Bethlehem Steel Co.

Pig Iron.—Current buying is almost entirely of carload lots of foundry iron, on which the current price range of $20.50 to $21 a ton, furnace, is fairly well maintained. Railroads are prominent among the consumers at present inquiring for small lots of iron. The Baltimore & Ohio is in the market for 300 tons of foundry grade and a carload of charcoal iron, the Norfolk & Western for a carload of low phosphorus, the Southern Railway and the Delaware, Lackawanna & Western for a carload each of foundry iron. Foundry melt in this district is small, especially among cast iron pipe foundries, but stocks of iron on consumers' yards are not large. Basic iron is inactive, with a Claymont, Del., consumer still testing the market before issuing a formal inquiry. Demand for low phosphorus is limited to occasional carload lots.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$21.26 to $21.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.76 to 22.26
East. Pa. No. 1X	22.26 to 22.76
Basic (del'd east. Pa.)	19.75 to 20.25
Gray forge	20.00 to 20.50
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. N. Y. State furnace)	22.00 to 23.00
Cop. br'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Reinforcing Bars.—Projects requiring reinforced concrete have begun to decrease, but there is still some pending business in this district, calling for small lots of bars, including a vehicular underpass in Camden, N. J., for the Delaware River bridge, and a bulkhead on the Schuylkill River being built jointly by the Pennsylvania Railroad and the city of Philadelphia. Prices are unchanged, with billet steel bars quoted at 1.95c. to 2c. a lb., Pittsburgh, or 2.27c. to 2.32c., delivered Philadelphia, and the extra for cutting to length usually waived. Rail steel bars are quoted at 1.85c. to 1.95c., Franklin, Pa., and Tonawanda, N. Y., or 2.17c. to 2.27c., delivered Philadelphia, with no extra for cutting to length.

Shapes.—Fabricating shops are well occupied, but are bidding on a smaller volume of new business. Recent bids on fabricated and erected material have been keenly competitive, and the smaller shops say that the present level leaves them little or no profit. Shape mills continue to maintain a fair rate of operation, but prices are lacking in firmness at 1.90c. to 1.95c. a lb., f.o.b. nearest mill to consumer, or 1.96c. to 2.01c., delivered Philadelphia.

Plates.—Shipyards, boiler shops, car and tank builders have provided a substantial part of the tonnage on mill books and, with a number of shipbuilding contracts still to be placed, continued buying is expected from this source. Bids on two ships of the Leviathan type for the United States Lines have been postponed from Nov. 15. A total of about 20,000 tons of plates and shapes will be required by the shipbuilder receiving this contract. The Export Steamship Co., which recently awarded four ships, is contemplating the construction of two more. Prices of plates range from 2c. to 2.05c., Coatesville, Pa., or 2.10c. to 2.15c., delivered Philadelphia. The minimum quotation is applied by most sellers to the larger orders and, as a considerable part of present buying is limited to small lots and miscellaneous specifications, 2.05c., Coatesville, is quoted.

Sheets.—A local automobile body builder has closed for a fair tonnage of high finished and blue annealed sheets, and a radio manufacturer has bought small lots of sheets in excess of estimated requirements to manufacture additional radio sets. On the basis of recent sales of blue annealed sheets, 2.35c., Pittsburgh, or 2.67c., delivered Philadelphia, for No. 13 gage applies only on small, miscellaneous specifications. Preferred buyers, such as automobile manufacturers, are usually quoted $2 to $4 a ton lower. No. 10 gage blue annealed plates are quoted at 2.20c., Pittsburgh, or 2.52c., delivered Philadelphia, with reductions of $2 a ton and more to preferred buyers. Black sheets are quoted at 2.75c. a lb., Pittsburgh, or 3.07c., delivered Philadelphia, but certain preferred buyers claim to have bought at a concession from this price. Galvanized sheets continue at 3.40c., Pittsburgh, or 3.72c., delivered Philadelphia.

Imports.—In the week ended Nov. 16, 10,674 tons of chrome ore arrived at this port, of which 5000 tons was from Portuguese Africa, 4824 tons from Cuba and 850 tons from Greece. Steel imports consisted of 99 tons of steel bands from France and 10 tons from Belgium, 81 tons of steel bars from Belgium, 29 tons of hoop steel from the United Kingdom, 311 tons of structural shapes from Belgium and 38 tons from Germany, 7 tons of steel scrap from the United Kingdom and 4 tons from Germany.

Old Material.—Consumer buying is limited, and the tendency of prices on all grades is downward. Brokers report no difficulty in securing sufficient material to fill current contracts and are unable to interest consumers in further purchases, as many are maintaining a low inventory of materials on their yards.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$15.00 to	$15.50
Scrap T rails	14.50 to	15.00
No. 2 heavy melting steel	12.50 to	13.75
No. 1 railroad wrought	16.00 to	16.50
Bundled sheets (for steel works)		11.50
Hydraulic compressed, new	14.50 to	15.00
Hydraulic compressed, old	12.00 to	12.50
Machine shop turnings (for steel works)		11.50
Heavy axle turnings (or equiv.)	14.00 to	14.50
Cast borings (for steel works and roll. mill)	11.00 to	11.50
Heavy breakable cast (for steel works)		14.50
Railroad grate bars	12.00 to	12.50
Stove plate (for steel works)		12.00
No. 1 low phos., hvy., 0.04% and under	21.00 to	22.00
Couplers and knuckles	19.50 to	20.50
Rolled steel wheels	19.50 to	20.50
No. 1 blast f'nace scrap	10.50 to	11.00
Wrot. iron and soft steel pipes and tubes (new specific.)		14.00
Shafting	19.00 to	19.50
Steel axles	21.00 to	22.00
No. 1 forge fire	13.50 to	14.00
Cast iron carwheels	15.50 to	16.00
No. 1 cast	16.00 to	16.50
Cast borings (for chem. plant)		14.50
Steel rails for rolling	16.50 to	17.00

Further Reduction in Wholesale Prices

October wholesale prices are reported by the United States Bureau of Labor Statistics at 96.3 compared with 97.5 in September, and with 97.8 a year ago. There has been a steady and accelerating decline for several months. Sharpest among the declines in October compared with September were those for farm products and foods.

Metals and metal products dropped from 104.1 to 103.6 between September and October, but both figures are well above the 101 of October, 1928. The reduction was participated in by the iron and steel component, nonferrous metals, agricultural implements and automobiles, but the item "other metal products" showed a fractional rise. Only in agricultural implements were the drops more than fractional. Among building materials, however, the item of structural steel dropped from 99.6 in September to 97 in October, both being compared with 94.5 last year.

J. W. Brainard Steel Co. Plans $300,000 Expansion

E. Theodore Sproull, president, J. W. Brainard Steel Co., Warren, Ohio, manufacturer of cold-rolled strip steel, galvanized strips and hoops, announces a program of expansion involving expenditure of $300,000. Two new buildings are to be added, on which work is to be started at once, while a new office building is to be erected in the spring. On May 23, 1929, Mr. Sproull and associates took over the Brainard company. He was at one time general sales manager of the Trumbull Steel Co., and later was vice-president of the National Association of Flat-Rolled Steel Manufacturers.

Factory Wages Highest Ever Recorded

Average weekly earnings in representative New York State factories in September are reported by the State Industrial Commissioner at $30.47, including all employees in both office and shop. This is the highest monthly figure ever recorded, replacing the previous record of $30.35 made last month.

The new figure compares with $30.09 last August and with $29.72 in September, 1928. Until last December no month had ever shown as high as $30.

Motor Car Output Still Declining

Automobile manufacturers will probably continue their curtailing of production for the remainder of the year and some of them now look for the resumption of activity along about the end of February, says *Automotive Industries*.

The level of operations thus far in November appears to be well under the October level. It is extremely difficult to make any estimates of November production at this time, but any guess exceeding 200,000 for the total of the industry might well be considered beyond conservatism. In November of last year factories of the United States and Canada turned out about 268,909.

Stock Sizes of Sheet Steel Have Been Reduced

The variety of stock sizes of sheet steel has been reduced from 1819 to 261 as a result of the simplified practice recommendation of the Division of Simplified Practice, Department of Commerce, Washington. The committee in charge of these practices has reaffirmed without change its recommendations for the coming year. Simplified practices in eaves trough and conductor pipe and in metallic cartridges also will be governed by the same recommendations which have governed during the past year.

Pacific Coast

Structural Steel Awards Largest in More Than Two Months—Demand for Other Products Fair

SAN FRANCISCO, Nov. 16.—(*By Air Mail.*)—Pacific Coast interest in iron and steel products continues and, while there has been some letup in demand, indications point to a good volume of business during the remainder of the year. Cast iron pipe and reinforcing steel bar bookings fell off this week, but structural steel awards were the largest in more than two months. Important lettings called for 2400 tons for the Eleventh Street viaduct, Tacoma, placed with Poole & McGonigle, and 738 tons for the Shasta River bridge in California, booked by the Minneapolis Moline Power Implement Co.

Pig Iron.—Sales and inquiries for foundry pig iron involve unimportant lots. Consumers appear little inclined to anticipate their requirements. Prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	25.00 to 26.00

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars. — Bookings of reinforcing steel bars were the smallest in more than five weeks. Among the more important lettings were 155 tons and 100 tons respectively for a store in Seattle and a penstock at Tacoma, placed with the Northwest Steel Rolling Mills, and 100 tons for an apartment in San Francisco, taken by W. C. Hauck & Co. A fair volume of business is pending and includes 800 tons for the Eleventh Street viaduct, Seattle, and 400 tons for a veterans' home in California. Los Angeles prices on out-of-stock material remain at 2.40c., base, on carload lots and at 2.70c. in smaller quantities. Prices in the bay district are $2 a ton lower.

Plates.—Plate prices remain weak and while 2.35c., c.i.f., is the usual quotation on small lots, as low as 2.15c. has recently been quoted on fairly large lots. The only award of importance went to the Steel Tank & Pipe Co. and involved 1400 tons for a 36 to 48-in. welded steel pipe line at Everett, Wash. Awards will most likely be made next week on 100 tons for a pipe line in Oakland and on 370 tons for one in Seattle.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.30c.
Soft steel bars	3.30c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.30c.
Struct. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100 lb. keg	3.40

Shapes. — Demand for structural steel in the Pacific Northwest has been exceptionally good during the past few weeks. Activity in the San Francisco district has fallen off somewhat, but bookings in the Los Angeles territory continue to involve some fair-sized lots. The McClintic-Marshall Co. took 100 tons and 150 tons for two apartments in San Francisco and 185 tons for an office building at Bakersfield, Cal. The Pacific Coast Engineering Co. secured 300 tons for a factory in San Francisco for the Link-Belt Co., and the Consolidated Steel Corporation booked 175 tons for a warehouse in Los Angeles for the Crane Co. The Wallace Bridge & Structural Steel Co. was awarded 625 tons for the Bremerton bridge in Washington and 120 tons for a bridge at Woodland, Wash. New inquiries were confined to small lots. Plain material is firm at 2.35c., c.i.f.

Cast Iron Pipe.—Demand for cast iron pipe remains quiet, and no lots of more than 100 tons were noted. Bids will be opened Dec. 2 on 293 tons of 6 to 10-in. Class B pipe for the improvement of La Mesa Colony, San Diego. C. G. Claussen & Co. were low bidders on 147 tons of Class B pipe for the East Bay Municipal Utility District, Oakland. Compton, Cal., has opened bids on 118 tons of 4 to 10-in. Class B pipe for Olive Street.

Steel Pipe.—With the exception of the 100,000-ton inquiry of the Standard Oil Co., San Francisco, for gas pipe, inquiries are for unimportant lots. Standard steel pipe is in fair demand and stocks in distributers' warehouses are well rounded out.

Track Material.—No action has yet been taken by the Southern Pacific Co. on its inquiry for 120,000 tons of 90 to 130-lb. T-rails. This company has placed with unnamed interests 14,000 tons of tie plates, 4000 tons of track spikes and 390 tons of track bolts.

St. Louis

Pig Iron Sales Drop to 2000 Tons—Large Scrap Consumers Hold Back Shipments

ST. LOUIS, Nov. 19.—Sales of pig iron fell off during the last week to about 2000 tons. The St. Louis Gas & Coke Corporation sold 1650 tons, including 500 tons of foundry grades to an implement manufacturer for shipmment this month and next; 250 tons to an Illinois melter for the same delivery, and five 100-ton lots for prompt shipment, all foundry iron, and 300 tons of malleable to a specialty maker for shipment before Dec. 31. A leading Southern maker sold 300 tons for shipment the remainder of the year. Southern makers have not yet opened their books for 1930 deliveries. Stove and implement interests continue to enjoy a heavy melt, but foundries catering to the automobile trade have slowed down somewhat. Pig iron prices continue firm.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$19.50 to $20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.42 to 18.92
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Coke.—Domestic coke continues in good demand, and piles at by-product ovens have been reduced materially. Smelters are increasing their orders for both breeze and large sizes. Demand for foundry coke has declined.

Finished Steel.—The demand for plates, shapes and bars is said to be fair. Schedules against contracts are being well maintained, although new business is light. The structural trade continues dull, with no local projects of sizable tonnage in sight.

Old Material.—Instructions to withhold shipments against contracts have been issued to dealers of old material by three of the largest consumers in the district, further depressing an already weak market. Lack of orders is the reason given by the mills for their action. No. 2 heavy melting or shoveling steel, miscellaneous standard-section rails, rails for rolling and stove plate are 25c. off, while No. 1 locomotive tires, railroad springs, steel car axles, railroad malleable are down 50c. Railroad lists: Louisville & Nashville, 7500 tons; Chesapeake & Ohio, 5240 tons; Chicago, Burlington & Quincy, 4370 tons; Missouri-Kansas-Texas,

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shaftings, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

2200 tons, including 500 tons of wheels and 200 tons of axles; Chicago & Alton, 1820 tons; Chicago, Indianapolis & Louisville, 1000 tons; Southern Pacific, 670 tons; New York, Chicago & St. Louis, 75 carloads; Chicago, Milwaukee, St. Paul & Pacific, 50 carloads; Nashville, Chattanooga & St. Louis, 15 carloads; and Pullman Co. (St. Louis), 5 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$13.00 to $13.50
No. 2 heavy melting or shoveling steel	12.00 to 12.50
No. 1 locomotive tires	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	14.00 to 14.50
Railroad springs	15.50 to 16.00
Bundled sheets	9.50 to 10.00
No. 2 railroad wrought	13.00 to 13.50
No. 1 busheling	9.75 to 10.25
Cast iron borings and shoveling turnings	9.25 to 9.75
Iron rails	13.00 to 13.50
Rails for rolling	15.00 to 15.50
Machine shop turnings	7.25 to 7.75
Heavy turnings	9.50 to 10.00
Steel car axles	18.00 to 18.50
Iron car axles	27.00 to 27.50
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	13.00 to 13.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	13.50 to 14.00
No. 1 railroad cast	14.50 to 15.00
Stove plate	11.75 to 12.25
Agricult. malleable	14.00 to 14.50
Relay. rails 60 lb. and under	20.50 to 23.50
Relay. rails 70 lb. and over	26.50 to 29.00

Canada

Curtailment in Automobile and Implement Lines

TORONTO, ONT., Nov. 19.—A slackening in business is apparent in two or three groups allied with the iron and steel industry in this country. The automotive industry appears to have been hit hardest as a result of the recent crash in the stock markets. The agricultural implement industry has also received a setback. This, however, is principally due to the reduced Canadian crop yield and the low price prevailing for wheat. It is understood that implement plants throughout Canada are now running from 30 to 50 per cent of capacity, compared with near-capacity operations a year ago.

The curtailed activities of these two industries alone have had a telling effect on the Canadian iron and steel industry as a whole. In most instances, however, steel plants are still running at capacity and have sufficient backlogs to carry them along for some time. Railroad orders have had a stimulating effect on the industry this year, with the result that plants have been able to maintain almost capacity operations, while at the same time balance sheets show much more substantial earnings than in other postwar years.

While business is fairly good at present, leading iron and steel interests of this country are unable, or reluctant, to make any statement with regard to 1930.

Pig Iron.—From hand-to-mouth buyers slight improvement in demand has developed, but in all instances tonnages are small, ranging from one to two cars to an occasional order of 200 tons. Shipments against contracts are going forward on schedule. Prices are unchanged.

Prices per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$23.60
No. 2 fdy., sil. 1.75 to 2.25	23.10
Malleable	23.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$25.00
No. 2 fdy., sil. 1.75 to 2.25	24.50
Malleable	25.00
Basic	23.50

Imported Iron, Montreal Warehouse

Summerlee	$33.50
Carron	33.00

Structural Steel.—Recent orders were chiefly in lots under 500 tons, but inquiry includes some large tonnages. Fabricating plants are running at full time, with backlogs sufficient to keep them at the present rate well into 1930.

Old Material.—New business was in better volume during the past week or 10 days. A few future delivery contracts for machinery cast had a stimulating effect on the market. Spot buying is the strong feature at the moment, however, and it is from the smaller consumers that the bulk of new business is coming. Steel scrap is moving slowly in both Toronto and Montreal markets, but a better demand has developed in the iron grades. No change has been made in buying prices.

Dealers' buying prices:

	Toronto	Montreal
Per Gross Ton		
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel borings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
Per Net Ton		
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

Cincinnati

Slackening in Demand for Pig Iron, Coke, Scrap and Finished Steel—Old Material Prices Decline

CINCINNATI, Nov. 19.—District buyers of pig iron are displaying extreme caution toward entering the market and are marking time to watch the trend in their own businesses. Sales in this district declined sharply last week, with district furnace representatives reporting approximately 2300 tons as the week's total. All of this was in small quantities, the largest orders having been for two cars. Not only is the current demand easing, but specifications against contracts are showing signs of slackening. In fact, several furnace representatives indicate that during the last week several consumers had requested delay on their usual shipments. While the cut in the automotive demand is most noticeable, specifications from other foundries also are being reduced. The quietness of this market is further reflected by the total absence of any sizable inquiry.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89 to $20.39
Ala. fdy., sil. 1.75 to 2.25	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Steel.—The local steel market is quiet and dull. Operating schedules of district sheet mills, which had been advanced about two weeks ago in anticipation of an improved automotive demand, have again been curtailed. Buyers are cautious. The one bright spot in the sheet market is the continued good demand for galvanized sheets for roofing purposes. One interest here indicates that this grade is contributing a large portion of the current bookings. Fabricated structural steel continues dull, and district fabricators are in need of business.

Coke.—So far this month, specifications for by-product foundry coke are well below the level of October, when a decline from September was reported. In fact, several oven representatives say that shipments on contracts are approximately 30 per cent under the October volume, and a

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.	3.75
	Net per 100 Ft.
Lap-weld steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

further decline on the total month's business is anticipated.

Old Material.—With mills curtailing shipments on contracts and refusing to renew as contracts terminate, the district old material market is very weak. Dealers are bidding 25c. less on heavy melting steel, No. 1 busheling and No. 2 wrought and 50c. less on No. 2 busheling than a week ago. The supply of scrap appears to be fairly good, but dealers are having difficulty in moving what they have.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$12.50 to $13.00
Scrap rails for melting	13.50 to 14.00
Loose sheet clippings	8.50 to 9.00
Bundled sheets	10.75 to 11.25
Cast iron borings	8.50 to 9.00
Machine shop turnings	8.00 to 8.50
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	14.25 to 14.75
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	12.50 to 13.00
Short rails	18.00 to 18.50
Cast iron carwheels	12.50 to 13.00
No. 1 machinery cast	18.50 to 19.00
No. 1 railroad cast	15.00 to 15.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Brake shoes	10.00 to 10.50
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Youngstown

Valley Mills at Lowest Point in Two Years

YOUNGSTOWN, Nov. 19.—Production schedules announced by Mahoning Valley steel companies indicate that activity this week is at the low point for the past two years.

The sheet mills at Haselton of the Sharon Steel Hoop Co. are completely idle for the week, as is the company's open-hearth furnace plant at Lowellville. Its strip mills at Sharon are operating on reduced schedules.

In the Mahoning Valley, only 46 of 120 sheet mills are scheduled, and only 19 of 51 independent open-hearth furnaces. Bessemer steel operations are being carried on at 75 to 80 per cent. In other departments, such as tin plate, strips, steel bars, plates and steel pipe, operations range between 60 and 65 per cent.

Fabricators are maintaining much higher schedules than the primary steel producers.

Buying by the automobile industry has been smaller than anticipated. Expected improvement this month in the buying by Chevrolet Motor Co. and the Ford Motor Co. has failed to develop.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex.	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb.	3.75

Buffalo

Pig Iron Buying Light, but Shipments Are Well Sustained —Steel Mill Operations Curtailed Further

BUFFALO, Nov. 19.—A demand for prompt shipment on old orders continues to be the feature of the local pig iron market. New business is scarce, but there is a steady flow of requests for iron from melters. Some melters have taken their entire November quota and have dipped into their December tonnage. Stocks of pig iron in producers' yards are the lowest in years, and, at the present rate of operation and consumption, they will be considerably lower by the first of the year. Inquiry is light, with an aggregate of 3000 or 4000 tons, most of which is reported from Canada and which may not be converted into Buffalo business. From lower New York comes an inquiry for 700 tons of foundry and malleable and from New England there is an inquiry for 1000 tons of foundry and malleable. The Eastern base has been cut to $17.50 in some instances. One of the stacks of the Hanna furnace Co. may go out this week, and this, along with the scarcity of stock iron, is expected to keep the market firm.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$19.50
No. 2X fdy., sil. 2.25 to 2.75	20.00
No. 1 fdy., sil. 2.75 to 3.25	21.00
Malleable, sil. up to 2.25	20.00
Basic	$17.50 to 18.00
Lake Superior charcoal	27.28

Finished Steel.—Operating rates of Buffalo mills are somewhat less than a week ago. The Donner Steel Co. is operating three open-hearths, a reduction of one, and the Lackawanna plant of the Bethlehem Steel Co. is operating at about 65 to 70 per cent. Structural business is quiet, though most of the shops are busy. One lot of 575 tons for a school in the town of Amherst, Erie County, has been placed with a Buffalo fabricator, and a few 50-ton lots have been placed. The market for reinforcing bars is dull, with nothing sizable placed and no volume of small tonnage. About 200 or 250 tons of reinforcing bars will be required for the new county jail at Albany, N. Y.

Old Material.—The market is still trending downward, with heavy supplies of scrap coming out and buying at a minimum. The latest important purchase was last week, when a mill bought a considerable tonnage of No. 1 heavy melting steel at $14.50. It was a direct purchase, and it is believed that a reciprocal arrangement entered into the transaction. The last sale of No. 1 heavy melting steel by a dealer was made at $15. The recent Michigan Central Railroad list brought $14.61, f.o.b. Black Rock, for heavy melting steel. Dealers are paying $14 for No. 1 steel. One of the larger plants, which had held up shipments, has increased its quota to three cars per week from each dealer. Another mill is understood to be offering $14 for heavy melting steel in 500-ton lots. A dealer with an order out for stove plate was able to purchase at $11.75.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.	$14.50
No. 2 heavy melting steel.	13.00
Scrap rails	15.00 to 15.50
Hydraul. comp. sheets	13.00
Hand bundled sheets	11.00 to 11.50
Drop forge flashings	13.75 to 14.00
No. 1 busheling	13.00
Hvy. steel axle turnings	13.50 to 14.00
Machine shop turnings	7.50 to 8.00
No. 1 railroad wrought	13.00 to 13.50
Acid Open-Hearth Grades:	
Knuckles and couplers	17.00 to 17.50
Coil and leaf springs	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Low phos. billet and bloom ends	18.00 to 18.50
Electric Furnace Grades:	
Short shov. steel turnings.	11.25 to 11.75
Blast Furnace Grades:	
Short mixed borings and turnings	11.25 to 11.75
Cast iron borings	11.25 to 11.75
No. 2 busheling	9.50 to 10.00
Rolling Mill Grades:	
Steel car axles	17.00 to 17.50
Iron axles	20.00 to 21.00
Cupola Grades:	
No. 1 machinery cast	15.00 to 15.50
Stove plate	12.50 to 12.75
Locomotive grate bars	11.00 to 11.50
Steel rails, 3 ft. and under	18.75 to 19.00
Cast iron carwheels	13.00 to 13.50
Malleable Grades:	
Industrial	17.50 to 18.00
Railroad	17.50 to 18.00
Agricultural	17.50 to 18.00
Special Grades:	
Chemical borings	12.50 to 13.50

Birmingham

Southern Furnaces Name $14 Base for First Quarter Delivery in Outside Territories—Steel Buying Improves

BIRMINGHAM, Nov. 19.—Southern furnaces have offered to take orders in St. Louis and other Middle West points at $14 for first quarter delivery, which is the same price that has applied on recent fourth quarter contracts in those territories. It is generally understood that district furnaces will actively solicit first quarter business in competitive territories where a trade has been established in recent months. No district business has been booked beyond the fourth quarter. Current district sales are very light, consisting of small spot orders taken at $14.50, base. A marked decline in shipments occurred last week and some iron is again going into stock piles. The several previous weeks of active shipments reduced backlogs to a low point. The No. 1 Ensley furnace of the Tennessee company was changed from basic to foundry iron on Nov. 9. Of the 16 active

furnaces, nine are on foundry iron, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.50
No. 1 fdy., 2.25 to 2.75 sil.	15.00
Basic	14.50

Finished Steel.—The market as a whole recovered fairly well last week from the drop in the previous week, and orders are again developing at a good rate. New business in bars, plates and sheets showed a decided improvement in the past few days. Sales of wire products are considered fair for the season. Orders are followed by requests for prompt shipments, as has been the case for some time. There have been no changes in prices during the past three weeks. Structural steel fabricators report a good volume of prospective business for the remainder of the year. No large orders have been booked in the last two weeks. Several important projects requiring reinforcing bars have been withdrawn from the market, and both sales and prospective business are at the low point of the year. The Tennessee company is operating seven open-hearths at Ensley and seven at Fairfield, an increase of one at the latter works. All six continue active at the Alabama City works of the Gulf States Steel Co.

Cast Iron Pipe.—The only new order of importance reported last week was 3000 tons of 12 to 24-in. pipe for St. Petersburg, Fla., let to the United States Pipe & Foundry Co. Bids were opened for small projects at Mendenhall and Tiplersville, Miss. The 4000-ton project at Dallas, Tex., is still pending. Aside from this project, the immediate tonnage in prospect is very light. Less business is coming in from distant territories than in several months. Municipalities have shown no interest in contracting for their 1930 requirements. Shipments are somewhat lighter than two or three weeks ago. Makers are maintaining base prices of $37 to $38.

Coke.—The unconsumed balance of fourth quarter coke contracts is plentiful, consequently there has been very little first quarter contracting so far. Prices remain at $5 a net ton, Birmingham.

Old Material.—Heavy melting steel, steel axles and scrap rails continue to maintain a fair rate of activity considering conditions. Prices are unchanged. Iron scrap prices are nominal owing to lack of trading.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$13.00 to	$13.50
Scrap steel rails		14.00
Short shoveling turnings		9.00
Cast iron borings		9.00
Stove plate	11.50 to	12.00
Steel axles		22.00
Iron axles		23.00
No. 1 railroad wrought	10.00 to	10.50
Rails for rolling		15.50
No. 1 cast		13.00
Tramcar wheels		12.50
Cast iron carwheels	13.00 to	13.50
Cast iron borings, chem.	13.50 to	14.00

Boston

Pig Iron Buying Light—Scrap Prices Drop—Warehouses Reduce Nail Quotations

BOSTON, Nov. 19.—Pig iron buying dropped to small proportions the past week. A Massachusetts machinery maker bought 500 tons for first quarter delivery, the Sullivan Machinery Co., Claremont, N. H., 250 tons, and there were numerous smaller lots sold. There is no important inquiry in the market. Prices apparently remain as heretofore. Buffalo stacks report foundries as taking iron on schedule and in some cases anticipating shipments. Other furnaces, however, note some holding up of shipments. While there are some bright spots in New England, the foundry industry in general is not so busy as a month ago, and some plants have laid off men in the past fortnight. Indian iron continues to arrive regularly in small tonnages, but receipts of Dutch iron have gradually tapered off.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25	$21.55 to	$22.05
†Buffalo, sil. 2.25 to 2.75	22.05 to	22.55
*Buffalo, sil. 1.75 to 2.25	22.41 to	22.91
*Buffalo, sil. 2.25 to 2.75	22.91 to	23.41
East. Penn., sil. 1.75 to 2.25	22.65 to	23.15
East. Penn., sil. 2.25 to 2.75	23.15 to	23.65
Va., sil. 1.75 to 2.25		25.21
Va., sil. 2.25 to 2.75		25.71
*Ala., sil. 1.75 to 2.25		24.11
*Ala., sil. 2.25 to 2.75		24.61
†Ala., sil. 1.75 to 2.25		20.25
†Ala., sil. 2.25 to 2.75		20.75

Freight rates: $4.91 all rail from Buffalo, and $4.05 rail and water; $3.65 all rail from eastern Pennsylvania; $5.21 all rail from Virginia; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Warehouse Business.—Wire nails and poultry staples have been reduced 5c. a 100 lb., making nails $3.20 a keg, base, from stock, and staples $6.05. Domestic mills are meeting more or less competition from German-made nails along the Atlantic seaboard, consequently prices today are 20c. a 100 lb. lower than a month ago. Demand for iron and steel in general is quite good for this time of the year, but individual orders are small.

Fabricated Steel.—The Boston Bridge Works, Inc., was low bidder on the Crawford Street bridge, Providence, R. I., involving 1000 tons of steel. Other bridge work pending includes eight bridges for the Boston & Maine Railroad, another New England railroad bridge, a private project in Vermont, a Boston & Maine Railroad bridge at East Northfield, Mass., and a municipal bridge at Fitchburg, Mass. It is expected that at least 4000 tons of steel for various other projects will be placed before Dec. 1. Competition among fabricators for work is keen, and some low prices are being made.

Old Material.—Further price concessions of 25c. to 50c. a ton are noted in No. 1 heavy melting steel, T and girder rails, forge flashings, blast furnace borings and turnings and chemical borings. The market for steel axles apparently is off $1 a ton, but there is so little doing it is difficult to establish prices. The status of business is the same as a week ago. That is, many owners of material will not sell at prevailing prices, and steel mills apparently require little scrap. Brokers are endeavoring to clean up a few old small orders. The export market is fairly active, but here again low prices quoted have a tendency to discourage offerings.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$9.75 to	$10.00
Scrap T rails	9.50 to	10.00
Scrap girder rails	8.75 to	9.00
No. 1 railroad wrought	10.00 to	10.50
No. 1 yard wrought	9.50 to	10.00
Machine shop turnings	6.00 to	6.50
Cast iron borings (steel works and rolling mill)	6.00 to	6.50
Bundled skeleton, long	8.75 to	9.00
Forge flashings	8.50 to	9.00
Blast furnace borings and turnings	5.50 to	6.00
Forge scrap	8.50 to	9.00
Shafting	14.00 to	14.25
Steel car axles	16.00 to	16.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	9.00 to	9.50
Rails for rolling	11.00 to	11.50
Cast iron borings, chemical	9.00 to	9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	$14.00 to	$14.50
No. 1 machinery cast	15.00 to	15.25
No. 2 machinery cast	13.00 to	13.25
Stove plate	11.00 to	11.50
Railroad malleable	18.50 to	19.00

Cast Iron Pipe.—The Watertown Arsenal has awarded 150 tons of 6 and 8-in. pipe and fittings to the Warren Foundry & Pipe Co., and Wayland, Mass., 100 tons of 6-in. to the same foundry. Salem, Mass., has placed 100 tons with the United States Pipe & Foundry Co. No other open municipal business is reported, but a sizable aggregate tonnage was placed privately the past week. There is an especially good demand for 4-in. pipe,

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flat, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

and prices are up about $1 a ton from their recent level. Most foundries are holding to a $4 differential on Class A and gas pipe, but at least one is securing $5 extra. Prices quoted openly on domestic pipe are: 4-in., $45.10 to $46.10 a ton, delivered common Boston freight rate points; 6 to 12-in., $40.10 to $41.10; 16 to 20-in.. $39.60.

Detroit

Automobile Production Trend Continues Downward—Some Plants Shut Down Temporarily for Inventory

DETROIT, Nov. 19.—The production trend in the automotive industry is still downward as inventory time is approached. Some of the plants have already shut down temporarily for inventory taking. It is thought that no change in the curve's present course will occur during the remainder of the year.

Except for the Auburn Automobile Co., which estimates a November output of 1500 cars, as compared with 1251 in October and 1867 in September, no official estimates of the probable production this month by various automobile companies are available.

Schedules are on a hand-to-mouth basis, and are influenced by the volume of retail sales, stocks of new and used cars in dealers' hands and other factors, at present somewhat intangible, which may grow out of the situation resulting from the stock market collapse.

The Chevrolet Motor Co., at Flint, recently shut down its motor and sheet metal departments temporarily for inventory and will soon stop work for a week in its assembly department. The Oakland Motor Car Co., Pontiac, Mich., has resumed operations after a short shutdown for inventory.

Owing to the present condition of the industry, automotive steel demand has been almost negligible. Until first quarter requirements are decided upon, the steel price situation will not become clarified. Steel companies apparently have little disposition to push sales at present, and price concessions probably would be of no avail.

The structural steel market is fairly active for this time of year. Plans are under way for a building for the Detroit *News* which will call for about 5000 tons of steel. The Union League Club of Detroit has started work on a new building in which 1800 tons of steel will be used. There is a fair volume of medium-size projects in the market. Some fabricators are busy, while others are in need of work.

Metal Goods Makers Meet To Form Association

An organization committee has been formed by contract metal goods manufacturers, tool and die makers to work on the establishment of a trade association. A preliminary meeting was held on Oct. 17, and a second organization meeting will be held Nov. 20, at Masonic Hall, 71 West Twenty-third Street, New York, at 7.30 p. m. Heading the committee is Adolph Hopp, 390 Second Avenue, New York.

Automobile Production Declines

WASHINGTON, Nov. 19.—Production of motor vehicles in the United States in October totaled 379,942 units, the lowest output since last December, when the total was 234,116 vehicles, according to reports received by the Department of Commerce from 149 manufacturers. The output in September was 415,697 units. In October, 1928, it was 397,284.

Production of passenger cars in October was 320,327, compared with 364,786 in September, while truck production went up to 58,747, compared with 50,046 in September, and production of taxicabs was 868, against 865.

In the first 10 months, production of motor vehicles in the United States totaled 5,017,806 units, against 3,867,503 for the same period of last year. The increase was 30 per cent.

Output of passenger cars was 4,325,504, compared with 3,399,425, a gain of 27 per cent. Truck production was 677,842, against 463,101 (up 46 per cent) and taxicab production was 14,460, compared with 4,977.

Henry & Wright Mfg. Co. Passes to New Hands

A controlling interest in the Henry & Wright Mfg. Co., Hartford, Conn., has been purchased by executives connected with Stone & Webster, Inc., Boston. At a meeting in Boston on Nov. 14 the following officers and directors were elected: C. J. Sorrells, chairman of board; J. F. Funk, president; W. J. Henry, vice-president; F. H. Farnham, treasurer; D. C. Jewett, secretary. Directors: Richard Harte, W. J. Hopkins, H. G. Philbrook, W. A. Ready, W. J. Henry.

The Henry & Wright Mfg. Co., manufacture the high-speed automatic punch press known to the trade as the Henry & Wright dieing machine. The company is manufacturing presses ranging from 10 to 200-ton capacity, and it contemplates expanding the line to take in presses up to 1000-ton capacity.

Railroad Equipment

Van Sweringen Roads Expected To Inquire for 10,000 Cars

ALTHOUGH railroad car orders the past week were meager and inquiries appeared for only 900 cars, the outlook is promising. The Chesapeake & Ohio and the Pere Marquette are expected to ask for bids on 10,000 cars within a week and the New York Central may pass soon upon its car-building program for next year, which is believed to call for the purchase of about 15,000 cars. The Texas Corporation is taking bids on 500 tank cars, while the St. Louis-San Francisco is inquiring for 300 underframes and a like number of superstructures.

Orders have been placed in the past week for 64 locomotives, of which 20 of the Mikado type are for the St. Louis-San Francisco and 25 are for the Pennsylvania. The Southern Pacific is in the market for 40 locomotives. Details of the week's business follow:

St. Louis-San Francisco is asking for bids on 300 underframes and a like number of superstructures. This road has purchased 20 Mikado type locomotives from Baldwin Locomotive Works.

Texas Corporation is inquiring for 300 insulated tank cars of 10,000-gal. capacity, 150 tank cars of 12,000-gal. capacity and 50 insulated tank cars of 10,000-gal. capacity.

Michigan Central has ordered four oil-electric locomotives from American Locomotive Co.

North American Car Corporation has ordered five tank cars from American Car & Foundry Co.

Pennsylvania Railroad has ordered 25 locomotives from Lima Locomotive Works, Inc.

Boston & Albany is taking bids on 10 locomotives in addition to five ordered from Lima Locomotive Works, Inc.

Kentucky & Indiana Terminal has ordered eight heavy switching locomotives from Lima Locomotive Works.

Southern Pacific is inquiring for 25 mallet type and 15 4-8-4 type locomotives, 300 automobile cars and 100 gondola cars.

Texas South-Eastern has ordered one locomotive from Baldwin Locomotive Works.

Illinois Terminal Co. has ordered one 90-ton combination electric locomotive from St. Louis Car Co.

Baltimore & Ohio has ordered 50 coaches from Pullman Car & Mfg. Corporation.

New York Central is inquiring for 12 rail motor cars.

Great Northern has ordered two dining cars from Pullman Car & Mfg. Corporation.

Northern Pacific will buy nine dining cars.

An inquiry for 10,000 cars for two Van Sweringen roads, the Chesapeake & Ohio and Pere Marquette, is expected within a week.

New York Central is expected soon to pass upon its car-building program for next year. It is believed in the car industry that about 15,000 cars will be on the budget.

Non-Ferrous Metal Markets

Copper Buyers, Expecting Lower Prices, Stay Out of Market—Tin Drifting—Zinc and Lead Firmer

NEW YORK, Nov. 19.

Copper.—In the expectation that prices will decline, as have those of tin, lead and zinc recently, buying by both domestic and foreign consumers continues in light volume both here and abroad. Melters are buying from hand to mouth. Despite this situation, prices continue firm at 18c. for electrolytic copper, delivered in the Connecticut Valley. Sellers continue to be optimistic that the price will stay at the present level. They feel that the matter of inventories alone will have some weight against a lower price in the case of some fabricators. They also feel that, because stocks abroad are at a vanishing point, any betterment in demand will first come from that source. Copper exporters continue to quote 18.30c., c.i.f. usual European ports, and Lake copper is firm at 18c. to 18.12½c., delivered. Curtailment of production at the mines is progressing, but it will be at least two months before its effect is a factor.

Tin.—In a quiet market about 700 tons of spot Straits tin changed hands during the week. Prices have been quite steady, but the market is drifting, with little interest shown by consumers or dealers. The new price for tin plate announced last week, which in the past has generally been the cause of considerable buying of tin, has been without effect thus far. It is possible that consumers are well covered for some time ahead. An interesting item of news is that the official shipments of tin from the Straits from Nov. 1 to 16, inclusive, were 6449 tons, tending to confirm estimates early this month of November shipments of 10,000 tons. The London market has turned stronger, with prices today about £4 to £5 per ton higher than a week ago, with spot standard quoted at £179 7s. 6d., future standard at £182 and spot Straits £183 7s. 6d. The Singapore price today was £185 2s. 6d. In a very quiet market here today, spot Straits was quoted at 39.75c., New York.

Lead.—Inquiry is somewhat better, with sales a little heavier. Prices have remained unchanged for the first week in the last three. Producers in St. Louis are asking 6.10c., and the price of the leading interest is unchanged at 6.25c., New York, as the contract price.

Zinc.—Possibly because belief is growing that the bottom in prices has

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Nov. 19	Nov. 18	Nov. 16	Nov. 15	Nov. 14	Nov. 13
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	39.75	40.00	39.87½	39.75	39.87½	39.25
Zinc, East St. Louis	6.25	6.25	6.25	6.25	6.25	6.25
Zinc, New York	6.60	6.60	6.60	6.60	6.60	6.60
Lead, St. Louis	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—
- High brass ..... 23.25c.
- Copper, hot rolled ..... 26.75c.
- Zinc ..... 10.50c.
- Lead (full sheets) ..... 10.25c.

Seamless Tubes—
- High brass ..... 28.25c.
- Copper ..... 29.25c.

Rods—
- High brass ..... 21.25c.
- Naval brass ..... 24.00c.

Wire—
- Copper ..... 19.87½c.
- High brass ..... 23.75c.

Copper in Rolls ..... 26.75c.
Brazed Brass Tubing ..... 30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

- Sheets, 0 to 10 gage, 3 to 30 in. wide ..... 33.00c.
- Tubes, base ..... 42.00c.
- Machine rods ..... 34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—	Base per Lb.
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	11.35c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	21.12½c.	to 22.12½c
Copper, hot rolled, base sizes	27.75c.	to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c.	to 31.00c.
Seamless Tubes—		
Brass	26.00c.	to 27.00c.
Copper	29.12½c.	to 30.12½c.
Brass Rods	18.87½c.	to 19.87½c.
Brazed Brass Tubes	29.12½c.	to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

- *Zinc sheets (No. 9), casks* ..... 10.75c. to 11.25c.
- *Zinc sheets, open* ..... 11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

- Tin, Straits pig ..... 41.50c. to 42.50c.
- Tin, bar ..... 43.50c. to 44.50c.
- Copper, Lake ..... 19.50c.
- Copper, electrolytic ..... 19.25c.
- Copper, casting ..... 19.00c.
- Zinc, slab ..... 7.50c. to 8.00c.
- Lead, American pig ..... 7.00c. to 7.50c.
- Lead, bar ..... 9.00c. to 9.50c.
- Antimony, Asiatic ..... 10.50c. to 11.00c.
- Aluminum No. 1 ingots for remelting (guaranteed over 99% pure) ..... 25.00c. to 26.00c.
- Alum. ingots, No. 12 alloy ..... 24.00c. to 25.00c.
- Babbitt metal, commercial grade ..... 25.00c. to 35.00c.
- Solder, ½ and ½ ..... 28.00c. to 28.50c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

- Tin, Straits pig ..... 45.00c.
- Tin, bar ..... 47.00c.
- Copper, Lake ..... 19.50c.
- Copper, electrolytic ..... 19.25c.
- Copper, casting ..... 18.75c.
- Zinc, slab ..... 8.00c. to 8.25c.
- Lead, American pig ..... 7.00c. to 7.20c.
- Lead, bar ..... 9.25c.
- Antimony, Asiatic ..... 16.00c.
- Babbitt metal, medium grade ..... 18.00c.
- Babbitt metal, high grade ..... 48.00c.
- Solder, ½ and ½ ..... 28.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.00c.
Copper, hvy. and wire	14.50c.	15.50c.
Copper, light and bottoms	12.50c.	13.50c.
Brass, heavy	8.00c.	9.00c.
Brass, light	6.75c.	7.75c.
Hvy. machine composition	11.50c.	12.50c.
No. 1 yel. brass turnings	9.25c.	9.75c.
No. 1 red brass or compos. turnings	10.75c.	11.75c.
Lead, heavy	4.75c.	5.25c.
Lead, tea	3.75c.	4.25c.
Zinc	3.25c.	3.75c.
Sheet aluminum	13.00c.	14.00c.
Cast aluminum	11.25c.	13.25c.

been reached, domestic demand for prime Western has been better in the last week, but it is still of a hand-to-mouth character. Consumers' stocks are known to be very low, but they continue to hesitate to commit themselves for the future. A meeting of the European cartel is slated for today, and this may have a sympathetic effect on prices at London so as to strengthen them; if so, this may tend to further stiffen the market here. Prime Western is quoted at 6.25c., East St. Louis, or 6.60c., New York, with concessions for small lots reported here and there. The ore price is again $40, Joplin, but sales last week were light at 5690 tons. Production was still high at 12,000 tons, leaving the surplus estimated at 54,052 tons. Rather drastic curtailment of ore production is reported from the Tri-State district, some properties shutting down for the remainder of the year and some for a shorter period.

Antimony.—In a quiet market Chinese metal for spot and future delivery is quoted at 8.62½c., New York, duty paid.

Nickel.—Ingot nickel in wholesale lots is offered at 35c. per lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at the published price of 23.90c. per lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO,—Few orders for non-ferrous metals have been taken in the week. Prices for copper, lead and zinc are holding while advances are shown for tin and antimony. A substantial volume of inquiry is developing in the old metal market.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 41c.; lead, 6.20c.; zinc, 6.35c.; in less-than-carload lots, antimony, 9.50c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 24c.; block tin, 34c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Non-Ferrous Ingot Metal Unfilled Orders

On Nov. 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferrous Ingot Metal Institute amounted to a total of 12,735 net tons. On Oct. 1 the unfilled orders were 16,246 tons and on Sept. 1 they were 15,065 tons.

Stockholders of the Allis-Chalmers Mfg. Co., Milwaukee, have approved an increase in the common stock to 2,000,000 no-par shares, from 500,000 shares of $100 par value. It is proposed to exchange the present outstanding stock on the basis of four new shares for each common share.

Witherow-Donner Merger Arranged

T. M. Girdler and R. J. Wysor Elected to Donner Board—W. P. Witherow Is Chairman

WITH the acquisition of the Witherow Steel Co. of Pittsburgh by the Otis & Co.-Eaton-Mather group of Cleveland, a merger has been arranged between this company and the Donner Steel Co. of Buffalo, against which company the Witherow company had pending a suit for $1,000,000 damages for alleged patent infringements. The Cleveland group bought control of the Donner company two months ago.

W. P. Witherow will continue as executive head of the Witherow company and will become chairman of the board of the Donner company. William H. Donner, president, and Robert Donner, vice-president of the Donner company, have resigned, severing all connections with the company.

T. M. Girdler, former president of the Jones & Laughlin Steel Corporation, and R. J. Wysor, who was general manager of that company, who resigned recently to join the Otis & Co.-Eaton-Mather interests, have been named members of the Donner board of directors, together with Christopher Baldy, a Buffalo attorney. Until such time as a president for the Donner company is appointed, F. K. Smith, vice-president and treasurer, is the chief executive officer.

The Donner-Witherow merger will be financed without public sale of stock. The Donner company will issue $5,022,000 in new 6 per cent preferred stock to provide for the exchange of securities.

Average Non-Ferrous Ingot Prices in October

CHICAGO, Nov. 16.—The Non-Ferrous Ingot Metal Institute reports the average prices per pound received by its membership on commercial grades of the six principal mixtures of ingot brass during the 28-day period ended Nov. 8. As there are, as yet, no generally accepted specifications for ingot brass, each item listed below is a compilation representing numerous sales of metal known to the trade by the designation shown, but each item, in reality, includes many variations in formulas. Until the program of standardizing the principal specifications, now progressing in cooperation with the American Society for Testing Materials, is completed, the following specifications will be understood to refer to "commercial grades":

	Cents
Commercial 80-10-10 (1% impurities)	17.105
Commercial 78%-metal	14.814
Commercial 81%-metal	15.483
Commercial 83%-metal	15.795
Commercial 85-5-5-5	15.936
Commercial No. 1 yellow brass ingot	12.739

COMING MEETINGS

NOVEMBER

National Founders' Association. Nov. 20 and 21. Annual meeting, Hotel Astor, New York. J. M. Taylor, 29 South LaSalle Street, Chicago, secretary.

New England Council. Nov. 21 and 22. Fifth annual conference, Hotel Statler, Boston.

DECEMBER

American Society of Mechanical Engineers. Dec. 2 to 6. Annual meeting, 29 West Thirty-ninth Street, New York. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

Taylor Society. Dec. 4 to 6. Annual meeting. Hotel Pennsylvania, New York. H. S Person, 29 West Thirty-ninth Street, New York, managing director.

National Exposition of Power and Mechanical Engineering. Dec. 2 to 7. Annual exposition, Grand Central Palace, New York. Charles F. Roth, Grand Central Palace, New York, manager.

Steel Founders' Society of America. Dec. 12. William Penn Hotel, Pittsburgh. Granville P. Rogers, 932 Graybar Building, New York, managing director.

Fabricated Steel Makes New High Record

WASHINGTON, Nov. 19.—Orders for fabricated structural steel in October, reported to the Department of Commerce by 180 firms, totaled 265,472 tons, representing 89 per cent of their monthly capacity of 298,725 tons. This compares with orders of 258,984 tons reported by 218 firms in September, representing 83 per cent of their capacity of 313,255 tons.

Computed tonnage booked in October was 342,650 tons, against 319,550 tons in September and 257,950 tons a year ago. Computed shipments were 354,200 tons, or 92 per cent of capacity, against 319,550 tons or 83 per cent of capacity. October shipments were the largest on record, displacing the previous record of 342,650 tons, made last August. In October, 1928, the computed total was 319,550 tons.

For the first 10 months computed bookings were 3,299,450 tons, or 86 per cent of capacity, against 2,798,950 tons or 72 per cent of capacity for the like period of last year. The 10-month total this year is just ahead of the 3,287,900 tons booked in 12 months of 1928, the previous annual record.

Computed shipments in 10 months were 3,022,250 tons, or 79 per cent of capacity, against 2,571,800 tons, or 67 per cent of capacity, last year.

PERSONAL

GEORGE L. DANFORTH, JR., has been made general superintendent at South works of the Illinois Steel Co., succeeding the late Peter A. Newton, whose death was reported in this column Nov. 7. Mr. Danforth, who has been assistant general superintendent at South works since 1918, entered the service of the United States Steel Corporation at its inception.

—

S. H. SLAYMAKER, of Fairbanks, Morse, & Co., Beloit, Wis., has been appointed to head the metals and foundry section of the Rock River Valley Safety Conference, which will meet at Madison, Wis., May 6, 1930, at which it is expected 1200 or more shop foremen and factory and construction executives and safety experts will attend from central Wisconsin and northern Illinois.

—

THOMAS FULLER, formerly manager of the Charlotte, N. C., office of the Westinghouse Electric & Mfg. Co., East Pittsburgh, has been named manager of the company's Atlanta district office, succeeding the late H. A. Coles. He was graduated from the Georgia School of Technology in 1905 and has been identified with the Westinghouse company since 1906.

—

R. L. BINDER, president, Metals Coating Co. of America, Philadelphia, spoke before the New England Railroad Club on Nov. 13, at the Copley-Plaza Hotel, Boston.

—

FREDERICK C. CRAWFORD, for seven years manager of the Detroit plant of the Thompson Products Co., Inc., Cleveland, has been made general manager and first vice-president of the company.

—

O. E. HARDER, professor of metallography, University of Minnesota, addressed the Milwaukee chapter of the American Society for Steel Treating, Nov. 12, on the fundamentals of micrographs.

—

H. S. WARWICK, formerly secretary of the Youngstown Real Estate Board, has been added to the industrial expansion department of the Youngstown Sheet & Tube Co., Youngstown.

—

G. L. SIMPSON, of the Pittsburgh Electric Furnace Corporation, was the guest at the November meeting of the New England Foundrymen's Association, held at the Exchange Club, Boston, Nov. 13.

—

LEON M. LAMB, controller of the Greenfield Tap & Die Corporation, Greenfield, Mass., has been made secretary of a newly-created Massachusetts Industrial Commission by the governor of that State.

W. L. RANIS, of the Union Malleable Iron Co., East Moline, Ill., spoke on sand control in the foundry at the monthly meeting of the Quad-City Foundrymen's Association, held at the LeClaire Hotel, Moline, Nov. 18.

—

RALPH H. CLORE, heretofore in charge of Cincinnati district sales for the United States Electrical Tool Co., has been made sales manager, succeeding GEORGE M. LAWRENCE, who has resigned to become vice-president of the General Radial Drill Co., Cincinnati.

RALPH H. CLORE

—

FRANK FRY has been appointed manager of the New York office of Hausman & Wimmer Co., Pittsburgh, dealer in scrap iron and steel. He has been identified with the company since last July, and previously was with the E. B. Leaf Co., Philadelphia.

—

HALLOWAY KILBORN, treasurer, Kilborn & Bishop Co., New Haven, Conn., will speak at the November meeting of the New Haven chapter of the American Society for Steel Treating at Hammond Laboratory, New Haven, on Nov. 21, on "Forging and Forge Die Design."

—

CARL C. GIBBS, who has been manager of the Indianapolis plant of the National Malleable & Steel Castings Co., Cleveland, has been made assistant to Henry F. Pope, president of the company. He has been succeeded in Indianapolis by STOWELL C. WASSON, who has been sales agent of the company in Indianapolis for the past eight years.

—

FRANK P. WALSH, for the past 14 years in the estimating and sales departments of the Whiting Corporation, Harvey, Ill., has been appointed manager of the newly-opened St. Louis office of the company at 1442 Syndicate Trust Building.

Obituary

LESTER S. CARROLL, vice-president in charge of purchases of the American Locomotive Co., died of a heart attack on a subway train in New York, Nov. 14, aged 61 years. He had been with the company since 1920, after years of experience in the purchasing field with various railroads, having been general purchasing agent for the Chicago & Northwestern at one time.

—

CHARLES B. MOORE, for many years connected with railway supply manufacturing concerns, died Nov. 11. Mr. Moore was chairman of the board of directors of the Oxweld Railroad Service Co., and president of the Ajax Brake Co. He was also a trustee of Lake Forest University, from which he was graduated in 1896.

—

EZRA EDWARD CLARK, for many years identified with the Dean Steam Pump Works, Holyoke, Mass., as designer and construction engineer, and previously associated with E. P. Allis & Co., Milwaukee, died on Nov. 11, at the Newton, Mass., hospital. He was born in Palmer, Mass., Jan. 27, 1858.

—

RICHARD CUSHMAN, formerly superintendent of the Cushman Chuck Co., Hartford, Conn., died at New London, Conn., Nov. 10, aged 41 years. In 1909 he became associated with the chuck company and in 1916 resigned to engage in the musical profession.

—

ROBERT W. FERGUSON, who succeeded to the managership of the New Orleans branch of the Lukens Steel Co., Coatesville, Pa., when Robert W. Wolcott, formerly its manager, was made president of the Lukens company a few years ago, died suddenly Nov. 13.

—

LEE R. FARRELL, aged 45, secretary-treasurer of the Industrial Silica Co., Youngstown, died Tuesday at Tucson, Ariz., where he went several months ago in an effort to regain his health. He was also secretary-treasurer of the Portage Silica Co., and held the same capacities with the Kent Sand & Gravel Co. Mr. Farrell had been identified with the silica business of the Middle-West throughout all of his business career.

—

FRANK A. HUNTER, president, Hunter Saw & Machine Co., Pittsburgh, died at his home in that city on Nov. 19, aged 57 years. With his brother, Harry A. Hunter, he organized that company, and since the death of the former several years ago, had been its president. He had been in ill health for about two years, and a son, F. A. Hunter, Jr., has had charge of the business.

Fabricated Structural Steel

Awards Total 41,000 Tons—Cincinnati Union Terminal Will Require 40,000 Tons

WITH contracts for structural steel amounting to 41,000 tons in the past week and with fresh inquiries put out for almost 60,000 tons, there is ample evidence that the somewhat unsettled business situation has not adversely affected building construction activities. In fact, awards and new work were the heaviest since the latter part of October. It is significant that approximately half of the lettings were for industrial expansion purposes.

The outstanding awards were 12,300 tons for a New York subway section and 6500 tons for a Ford assembly plant at Edgewater, N. J. The feature among inquiries was the taking of bids for the first part of the building of the Union Railroad Terminal at Cincinnati, which will take at least 40,000 tons of steel. Awards follow:

BOSTON & MAINE RAILROAD, 365 tons, signal bridges, to Boston Bridge Works, Inc.

MAYNARD, MASS., 294 tons, American Cyanamid Co. plant units, to a New Jersey fabricator.

FAIRFIELD, CONN., 200 tons, State bridge, to an unnamed fabricator.

ATHOL, MASS., 113 tons, theater, to Eastern Bridge & Structural Co.

DANVERS, MASS., 100 tons, school, to Boston Structural Co.

PROVIDENCE, R. I., 1000 tons, Crawford Street bridge, to Boston Bridge Works, Inc.

NEW YORK CENTRAL RAILROAD, 230 tons, bridge, to American Bridge Co.

NEW YORK, 1800 tons, apartment building at 104th Street and Central Park West, to Easton Structural Steel Co.

NEW YORK, 750 tons, apartment building at 131-135 East Eightieth Street, to Easton Structural Steel Co.

NEW YORK, 350 tons, apartment building at Manhattan Avenue and 106th Street, to J. Klein, Inc.

NEW YORK, 12,300 tons, section 10, route 110, of subway, through Rosoff Subway Construction Co., to American Bridge Co.

BROOKLYN, 5850 tons, Kings County Hospital, formerly reported awarded to Harris Structural Steel Co., to Taylor-Fichter Steel Construction Co.

BROOKLYN, 450 tons, public school No. 199, to Easton Structural Steel Co.

CAMDEN, N. J., 140 tons, Fifth Street vehicular underpass for Delaware River Bridge, to American Bridge Co.

VALLEY STREAM, L. I., 100 tons, airplane hangars, to Jones & Laughlin Steel Corporation.

EDGEWATER, N. J., 6500 tons, assembly plant for Ford Motor Co., to McClintic-Marshall Co.

YONKERS, N. Y., 485 tons, St. John's Riverside Hospital, to Hinkle Iron Works.

BRIGHTON, N. Y., 100 tons, highway bridge, to American Bridge Co.

ELIZABETH, N. J., 600 tons, telephone building, to Hinkle Iron Works.

NEWPORT NEWS, VA., 500 tons, boat plant for Horace E. Dodge Boat & Plane Corporation, to Virginia Bridge & Iron Co.

BALTIMORE & OHIO RAILROAD, 700 tons, bridges, to American Bridge Co.

BROOKNEAL, VA., 265 tons, bridge, to Virginia Bridge & Iron Co.

MEADOWBROOK, W. VA., 800 tons, Grasselli Chemical Co., to McClintic-Marshall Co.

CLEVELAND HEIGHTS, 370 tons, Monticello School, to Niles Forge & Mfg. Co.

DETROIT, 550 tons, Elks Temple, to R. C. Mahon Co.

FORT WAYNE, IND., 130 tons, theater, to Central States Bridge Co.

FORT WAYNE, 180 tons, building for Joslyn Mfg. & Supply Co., to Indiana Bridge Co.

STATE OF ILLINOIS, 1650 tons, Welfare Building, to Mississippi Valley Structural Co.

CHICAGO, 140 tons, alterations to *Tribune* Tower, to Duffin Iron Works.

PROVISO, ILL., 500 tons, high school, to Mississippi Valley Structural Steel Co.

KANSAS CITY, MO., 1200 tons, Phillips Hotel, to Kansas City Structural Steel Co.

DENVER, 550 tons, Publix Theater, to E. Burkhardt Sons Steel & Iron Works, local.

STATE OF OKLAHOMA, 1150 tons, Pack Saddle bridge across South Canadian River, to Lakeside Bridge & Steel Co.

EVERETT, WASH., 1400 tons plates, 36- to 48-in. welded steel pipe line, to Steel Tank & Pipe Co.

WOODLAND, WASH., 120 tons, bridge for Northwest Electric Co., to Wallace Bridge & Structural Steel Co.

PORT ANGELES, WASH., 300 tons, pulp mill for Olympic Forest Products Co., to Isaacson Iron Works.

BREMERTON, WASH., 625 tons, Bremerton bridge, to Wallace Bridge & Structural Steel Co.

TACOMA, WASH., 2400 tons, Eleventh Street viaduct, to Poole & McGonigle.

PHOENIX, ARIZ., 170 tons, bridge on Holbrook-Lupton highway; general contract to F. D. Shufflebarger, Albuquerque, N. M., steel to unnamed bidder.

PORTLAND, ORE., 100 tons, hangar on Swan Island, to Poole & McGonigle.

SAN FRANCISCO, 350 tons, warehouse for Western Sugar Refining Co., to California Steel Co.

SAN FRANCISCO, 300 tons, factory for Link-Belt, Meese & Gottfried Co., to Pacific Coast Engineering Co.

SAN FRANCISCO, 150 tons, apartment building, Sixteenth and Clement Streets, to McClintic-Marshall Co.

SAN FRANCISCO, 100 tons, apartment building, Fifteenth Avenue and West Portal Street, to McClintic-Marshall Co.

BAKERSFIELD, CAL., 120 tons, telephone building, to Judson-Pacific Co.

BAKERSFIELD, 185 tons, Haberfelde Building, to McClintic-Marshall Co.

LOS ANGELES, 175 tons, warehouse for Crane Co., to Consolidated Steel Corporation.

YORBA LINDA, CAL., 125 tons, packing plant, to Pacific Iron & Steel Co.

SACRAMENTO, CAL., 738 tons, Shasta River bridge, to Minneapolis-Moline Power Implement Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

SOMERVILLE, MASS., 100 tons, ice manufacturing plant.

NEW YORK, 5150 tons, section 3, route 110, of subway in Brooklyn; readvertised for bids which are due Dec. 3.

NEW YORK, 3200 tons, loft building at Seventy-sixth Street and Madison Avenue.

NEW YORK, 1450 tons, two apartment buildings at 431 East Fifty-first and on East Fifty-second Street.

NEW YORK, 330 tons, widening of Washington bridge.

NEW YORK, 1250 tons, building at Fifth Avenue and Fifty-seventh Street.

PENNSYLVANIA RAILROAD, 375 tons, bridge at Shinnecock, Long Island.

ERIE, PA., 300 tons, building for Mutual Telephone Co.

AUBURN, N. Y., 400 tons, building for Firth Carpet Co.

RICHMOND, VA., 2000 tons, warehouse for American Tobacco Co.

DETROIT, 5000 tons, building for Sharer estate.

DETROIT, 2000 tons, Union League Club.

FLINT, MICH., tonnage unstated, power house for Dow Chemical Co.

CLEVELAND, 1500 tons, National Town and Country Club building, Thompson, Starrett & Co. general contractors.

CINCINNATI, 40,000 tons, Cincinnati Union Terminals Co.; first inquiry out for unstated tonnage in connection with this project.

CHICAGO, 1000 tons, Twelfth Street bridge.

Reinforcing Steel

Awards, Totaling 2500 Tons, Are Exceptionally Light

REINFORCING steel lettings, amounting to 2500 tons, reflect a seasonal slackening in construction work. The largest awards were 575 tons for a school at Amherst, N. Y., and 550 tons for an industrial plant at Chicago. Fresh inquiries are very light, totaling only 1200 tons. Awards follow:

STATE OF CONNECTICUT, 200 tons, road work, to Concrete Steel Co.

AMHERST, N. Y., 575 tons, school, to R. S. McMannus Steel Construction Co.

CHICAGO, 550 tons, for Grigsby-Grunow Co., 200 tons to Kalman Steel Co. and 350 tons to Olney J. Dean & Co.

SPRINGFIELD, ILL., 450 tons, State buildings, to Inland Steel Co.

SAN FRANCISCO, 100 tons, apartment building, Union Street, to W. C. Hauck & Co.

TACOMA, 155 tons, penstocks for Lake Cushman project, to Northwest Steel Rolling Mills.

SEATTLE, 100 tons, store for Firestone Tire & Rubber Co., to Northwest Steel Rolling Mills.

PORTLAND, ORE., 100 tons, hangar, Swan Island, to Mercer Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

ALBANY, N. Y., 200 tons, County jail.

CLEVELAND, 120 tons, repeater buildings for American Telephone & Telegraph Co.

SPRINGFIELD, ILL., 150 tons, addition to Centennial building.

GRANITE CITY, ILL., 130 tons, St. Elizabeth's Hospital.

LOS ANGELES, 125 tons for city; bids Nov. 19.

SACRAMENTO, CAL., 317 tons, paving work in Imperial County; bids Dec. 4.

Sales Cartel Planned for Continent

British Costs Bother Pig Iron Makers—Germany Using More Aluminum—Aircraft Engine Builders Busy

(By Cable)

LONDON, ENGLAND, Nov. 18.

DOMESTIC demand for Cleveland pig iron is well sustained and likely to increase, as the Furness Shipbuilding Co., Ltd., has secured orders for seven large, all-British tank ships. Export sales are restricted by the high price, but makers' stocks are all sold and current output is going into consumption.

Hematite prices are firm and makers are well sold into February, asking up to £4 1s. ($19.64) a ton, but accepting tonnage for delivery before the end of the year at £3 18s. ($18.90) a ton.

New business in finished iron and steel is quiet, but specifications are coming in freely against domestic orders which were placed prior to the meeting of the steel makers' committee and mills are generally well engaged.

Export business still lags, but inquiry is more promising. The British Steel Makers' Export Committee, which handles large export orders in certain markets, is likely to form a central sales office in London.

The Government is meeting the employers' and workers' executives in the shipyard dispute on Nov. 19, when it is hoped that a lockout will be averted.

British exports of pig iron in October were 36,000 tons, of which the United States received 1300 tons. Total exports of iron and steel were 390,500 tons.

Tin plate business is steady and prices are likely to advance if the tin market rises materially, as makers are well sold ahead and current unfilled orders are the largest in a number of years. Some mills are booked well into the first half of next year. New business is fair with heavy Far Eastern demand for light, 14 x 20-in. tin plate, because of restricted supplies.

Galvanized sheet orders are small, but scattered, with Indian demand poor. Japanese makers are reported outbidding British mills on Indian orders for No. 24-gage galvanized sheets and are offering increasing competition in China and Africa. Black sheets are inactive in the Japanese specifications and prices have been reduced.

Continental markets have been steadied as a result of the International Steel Cartel's output restriction plans, so that with makers receiving sizable orders some mills are naming 12 to 14 weeks as the earliest delivery. British consumers are buying lightly, especially as the British sheet trade is very quiet.

British Pig Iron Costs High —Export Trade Small

LONDON, ENGLAND, Nov. 8.—The iron and steel trade remains in small volume. The tone of the pig iron market, particularly on the North East Coast, is improved, with consumers showing slightly less caution in placing orders. Makers, however, are dissatisfied with current prices, as production costs continue to rise steadily. In the Cleveland district, blast furnaces are well engaged for the current month, but there has not been much forward buying and, as a result, Bolckow, Vaughan & Co., Ltd., is blowing out one furnace. Stocks of Cleveland iron are small, so that makers are able to maintain their prices, but merchants with low-priced contracts are selling at slightly less than the furnaces. Most of the demand has been from domestic sources, since foreign buyers are reluctant to pay present prices, especially in view of the weaker tone on the Continent.

Hematite furnaces have been able to sell some good tonnages abroad, especially in Southern Europe, and have advanced their prices to £3 18s. ($18.95) per gross ton for East Coast, mixed numbers, which is still considered about 2s. (49c.) less than cost. Coke is scarce, with prices rising steadily, 24s. ($5.83) a ton having

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.85

British Prices, f.o.b. United Kingdom Ports

Cleveland No. 3 foundry	£3	12½s.	to	£3	13½s.	$17.58	to	$17.82
East Coast hematite	3	18	to	4	1	18.94	to	19.64
Ferromanganese, export	13	10	to	14	0	65.47	to	67.90
Billets, open-hearth	6	5	to	6	7½	30.31	to	30.92
Sheet bars, open-hearth	6	5	to	6	10	30.31	to	31.52
Black sheets, Japanese specifications	12	10				60.62		
Tin plate, per base box	0	18¾	to	0	19	4.54	to	4.60
Rails, 60 lb. and heavier	7	15	to	8	15	37.59	to	42.43
						Cents per Lb.		
Steel bars, open-hearth	7	15	to	8	10	1.67	to	1.84
Beams, open-hearth	7	2½	to	7	12½	1.55	to	1.65
Channels, open-hearth	7	7½	to	7	17½	1.60	to	1.71
Angles, open-hearth	8	2½	to	8	12½	1.76	to	1.86
Ship plates, open-hearth	7	12½	to	8	2½	1.66	to	1.76
Black sheets, No. 24 gage	10	0	to	10	5	2.17	to	2.21
Galvanized sheets, No. 24 gage	12	15	to	13	0	2.76	to	2.86

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	8s	to	£3	11½s.	$16.49	to	$17.33
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3	7	to	3	8	16.24	to	16.49
Billets, Thomas	4	13	to	4	13½	22.56	to	22.80
Sheet bars, Thomas	4	12	to	4	12½	22.31	to	22.43
Wire rods, low C., No. 5 B.W.G.	6	3	to	6	5	29.82	to	30.30
Rails, 60 lb. and heavier	6	8½	to	6	10*	31.16	to	31.52
Rails, light	6	1½				29.46		
						Cents per Lb.		
Steel bars, merchant	5	5	to	5	7½	1.14	to	1.16
Steel bars, deformed	5	3	to	5	4	1.12	to	1.13
Beams, Thomas, British standard	4	19	to	5	5	1.07	to	1.14
Channels, Thomas, American sections	5	14	to	5	18	1.25	to	1.27
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5	2	to	5	7½	1.09	to	1.16
Angles, Thomas, 3-in.	5	6				1.14		
Ship plates, open-hearth inspected	7	5				1.61		
Black sheets, No. 31 gage, Japanese	12	4	to	12	5	2.68	to	2.70
Hoop and strip steel over 6-in. base	5	14				1.25		
Wire, plain, No. 8 gage	7	2½	to	7	3½	1.54	to	1.55
Wire, galvanized, No. 8 gage	8	15	to	8	16	1.87	to	1.89
Wire, barbed, 4-pt. No. 12 B.W.G.	11	4	to	11	9	2.47	to	2.48
Wire nails, base	6	7¼				$1.75	per	keg
Wire nails, assortments, 1 to 6-in. keg	10	6½				2.23		

*Open-hearth steel, 8s. ($1.94) per ton extra.

been paid for Durham coke of good average quality.

In high-quality semi-finished steel, domestic makers, particularly in Sheffield, are supplying the bulk of British requirements, but most of the business in ordinary crude steel has gone to Continental makers, the recent recession of the market having made their prices attractive.

Producers of finished products have little new business except for certain domestic construction and engineering orders. Export is difficult with keen competition on the Continent, and most of the export business now being booked is with Colonial railroads, shipping companies and Government departments. Decision of the International Steel Cartel to restrict its production quota by 10 per cent is expected to aid in advancing Continental prices, which should result in some increase of business abroad for British sellers.

German Builder of Wasp and Hornet Motors Busy

HAMBURG, GERMANY, Nov. 4.—The Bayrische Motorenwerke A. G., Munich, which builds the Wasp and Hornet motors under license from the Pratt & Whitney Aircraft Corporation, has had substantial motor sales in Germany and for export. Orders from abroad have been from Asia and Mediterranean countries and, added to a good domestic business, have permitted full operation, which is expected to continue until July, 1930.

This company is also building the British Austin automobile motor and has introduced on the German market a new design of small car with 775 cu. cm. cylinder volume. This model is being sold at a low price with considerable success and is a direct competitor of the popular small car of the Opel works, controlled by the General Motors Corporation.

Gain in Exports of Wood-Working Machinery

Foreign markets for American sawmill and wood-working machinery have been gradually expanding during the past few years. With the exception of a slight drop in 1926, exports have tended steadily upward, according to the Industrial Machinery Division, Department of Commerce. They totaled more than $3,200,000 in 1928, compared with $2,560,000 in 1927, $2,434,000 in 1926 and $2,446,000 in 1925.

Canada is by far the best customer for American sawmill and woodworking machinery, in 1928 accounting for 22 per cent of the total. The United Kingdom ranks next, taking American sawmill machinery to the value of $457,000 last year. Sales to Russia, after averaging about $40,800 during the preceding three years, rose suddenly to more than $275,000 in 1928. Both the Philippine Islands and Australia bought well over $200,000 worth last year.

Europe Plans Sales Cartel

Continental Mills Agree to Cooperate in Effort to Form Large Export Sales Organization

DÜSSELDORF, GERMANY, Nov. 11.—That the long sought and much discussed selling organization for the International Steel Cartel may take form before the end of this year appears possible from the fact that the committee working on such an organization finally gained the consent of all cartel members last month and will introduce its formal proposal at the next meeting. It is generally realized in the cartel, especially in Germany, that the present plan of a maximum quota for each member country fails when business is good, as it is impossible to fix a fine that a member is not willing to pay when the possibility of additional business appears.

The plan in its preliminary form calls for four subsidiary cartels, grouping the membership of the International Steel Cartel, as follows: Group No. 1, Germany and the Saar; Group No. 2, Belgium, including Luxemburg; Group No. 3, France; and Group No. 4, Austria, Czechoslovakia and Hungary. A central sales office is proposed in Luxemburg, or some Swiss city, and export prices will be maintained as firmly as possible. A domestic cartel in a member country will not be permitted by the selling cartel to revise its prices without the consent of the other three groups.

The sales cartel will control export prices of semi-finished steel, bars, plates, beams, rods and Thomas quality structural shapes. Provision has not been made to include cold rolled hoops and sheets thinner than 3 mm., open-hearth structural steel, or products already internationally controlled, such as tubes and rails.

The allotment for each of the four groups in the cartel will be on the basis of the exports of each group in 1929. Should orders be accepted in excess of these allotments they will not be subject to a fine, but will be distributed pro-rata to all members. An interesting feature is the proviso that each group in the cartel must forward a copy of its contracts to the central selling office, which will keep the contracts in a confidential record, not available to the members of other groups. The sales organization has full authority over all contracts.

It will not be the purpose of the selling cartel to establish sales offices abroad and agents will be appointed only in certain European markets, such as London, Rotterdam and Antwerp. As in the past, it is intended to execute overseas business through the mills' own sales offices, or through exporters and importers. In the case of exporters it is planned to give uniform trade discounts based on quantities purchased. For example, these will range from 2.50 per cent to 5 per cent on bars.

While this proposal has not become effective, all members of the International Steel Cartel have agreed to cooperate on the basis of these conditions, which may be altered in certain details before becoming effective.

Large Mills Force Renewal of German Cartels

DÜSSELDORF, GERMANY, Nov. 4.—It appears probable that the German domestic syndicates in the steel industry will be generally renewed for another five years on or before Dec. 20.

At the meeting of the cartels Oct. 28, it was agreed that all domestic syndicates should terminate at one time on Jan. 31, and Dec. 20 was fixed as the latest date at which new agreements for their continuation could be negotiated. Consequently, should any cartel not be renewed, the members could immediately begin selling for delivery after Jan. 31 without being subject to any control. This decision was reached despite vigorous opposition from the smaller producing members of the cartels, who have ceased to maintain sales organizations, having become entirely dependent upon their cartel for distribution. These members would, therefore, be forced to assemble a sales personnel and begin selling direct in about six weeks. The larger producing members have their own sales departments, which could be rapidly increased to whatever size proved necessary.

Setting an early date for renewal of the various cartels is believed by many to have been purposely adopted by the larger producers to force the small plants to abandon their demands for increased allotments and special conditions, which were proving obstacles to renewal. It has evidently served the purpose intended and about the only remaining question to be settled before general renewal of the agreements is the allotment to be given to the Friedrich Krupp A.G., Essen.

Foreign Steel Sold in Japan on Price and Delivery

YOKOHAMA, JAPAN, Oct. 15.—Inquiry for finished steel has increased considerably as a result of building construction and repairs and bridge work. Much of this business is going to importers of foreign material, despite domestic producers' need of tonnage. The reason is said to be the uncertainty of deliveries from the Government works and other Japanese mills, especially when forward shipment is specified, and a slight advantage in price in favor of imported material. Shapes are available at £6 14s. per ton (1.47c. per lb.), c.i.f. Japanese port.

German Tariff Trend Upward

Advocates of Higher Duties Point to Example Set by United States—High Automotive Duties

BERLIN, GERMANY, Oct. 25.—The tariff bill under consideration in the American Congress has supplied propaganda to high-protection advocates in Germany, and various proposals for downward revision of the German tariff have been temporarily shelved. The so-called "minor" tariff of August, 1925, which provided for considerable increases in the duties on automotive products, typewriters, cash registers and other leading American export items, was scheduled to expire Dec. 31, this year. It is now believed that it will be extended.

Following the Geneva Economic Conference in 1927, the Cabinet introduced a bill reducing the duties on 141 items in the tariff, but this bill has not been passed and is considered dead. During the summer, duties on wheat, barley and other American export foods were advanced and when the commercial treaty with Sweden expires further advances in these rates will probably be made. A duty is likely to be imposed on raw aluminum, which is at present duty free but on the import prohibition list, to be brought in only under license.

As the Reichstag in committee has decided to ratify the Geneva convention resolution abolishing import and export prohibitions, a duty on aluminum is regarded as essential to prevent the United States and Canada from swamping the German market. Although German public opinion still appears to favor lower tariffs, agitation from industries that claim to be threatened by low-priced foreign products is strong.

Canada to Consider New Iron and Steel Tariffs

The Advisory Board on Tariff and Taxation of Canada has published its new suggested schedule of iron and steel products made in Canada or imported into the Dominion. The revised schedule comprises thousands of articles into which iron and steel products enter. No tariff rates are entered on the new schedule, these being for the minister of finance to decide and include in his budget.

The board on Nov. 26, will open its most important hearing since its inception. The entire schedule will be dealt with at the hearing, which will continue for several weeks.

The new schedule, which comprises a book of 84 pages, is to be circulated throughout Canada to any manufacturer, producer or consumer who desires it. The Canadian Manufacturers' Association will send out about 4500 copies to its members. Any business man or manufacturer who believes his business will be affected in any way will have the right to make his own representations to the board, either by mail or personally. No sworn evidence is taken, but the board asks for facts to substantiate claims.

The iron and steel schedule has not been revised since 1906 and upon evidence at the hearing tariff charges in the next budget will be based.

After the hearing the evidence will be laid before the minister of finance and with the tariff experts of the board and of the Department of Finance the new rates will be agreed upon.

German Aluminum Demand Increasing

HAMBURG, GERMANY, Nov. 4.—Despite recent increases in the capacity of aluminum producing plants in Germany, requirements are such that there are almost no existing stocks. It is estimated that the 1929 output of aluminum may exceed the 1928 figure of 35,000 tons by 7000 to 8000 tons. The question of a duty on aluminum has not yet been decided, but aluminum producers have agreed not to advance the domestic price of aluminum beyond the world market level.

Japan Expects to Buy Less Indian Iron

YOKOHAMA, JAPAN, Oct. 15.—Importation of Indian pig iron may be reduced to a minimum during the coming year, if the new 500-ton blast furnace at Yawata is ready for operation as soon as expected. Of the 1,000,000 tons of pig iron annually required by the Government works, about 100,000 tons has been bought from the South Manchuria Railroad Co. furnace at Anzin, Manchuria. With the new Government Works furnace in operation, the company will be self-supplying, which will leave the Anzin pig iron for sale in the open market to other Japanese consumers, who are now using imported iron, principally from India.

German Wire Rod Cartel May Lower Prices

HAMBURG, GERMANY, Nov. 4.—With its members unable to agree on allotments and methods to meet outside competition, the German Wire Rod Cartel is faced with serious difficulties. A number of members of the cartel are advocating further price reductions in view of the lower market for wire and wire products. It is pointed out that reduced wire prices for export have stimulated business in the United Kingdom and that British wire mills which largely use Continental wire rods have been unable to reduce their prices on wire. The margin for conversion of wire rods into wire has recently been narrowed by 15s. to 25s. ($3.63 to $6.05) a ton.

A reduction in wire rod prices would aid British and other foreign consumers to meet present market prices on wire, it is argued, and would result in an increase in wire rod exports. Although the official price of the cartel is still £6 5s. ($30.37) a ton, f.o.b. Antwerp, concessions of 1s. to 2s. (24c. to 48c.) a ton have been made on recent sales.

German Tube Prices Exceed British and American

HAMBURG, GERMANY, Nov. 4.—Members of the German Tube Syndicate are protesting against present export prices of that organization. The quotations are slightly higher than the prices of American and British mills, but the syndicate explains this unusual situation by the statement that Germany has exceeded its quota in the International Tube Cartel and must reduce export sales until British and American works have reached their allotment.

The producers and sellers of tubes point out that this policy has resulted in curtailment by certain mills and has forced German exporters to place desirable export business with mills in France, Belgium and the Saar. It it further claimed by the tube mills that, although all the important world producers are in the cartel, except certain makers in Spain, Italy and Poland, the market is not effectively controlled and cartel prices are continually shaded by outsiders as well as by other member countries.

Cartel Quota Reduction May Not Aid Business

PARIS, Nov. 6.—Action of the executive committee of the International Steel Cartel in hastily meeting on Oct. 30, and recommending a 10 per cent reduction in all quotas, effective Nov. 1, equivalent to 3,250,000 tons, is attributed to the cancellations of export orders following the first American stock market break. There has been a steady decline in domestic demand since August, but Belgian and certain German mills have been insisting on full output because of their export business. It is believed in some quarters that the recent 10 per cent reduction has come too late to cause improvement and without some unexpected favorable change, another reduction may be necessary in January.

The Federal Trade Commission has authorized the holding of a trade practice conference with the fire-resisting safe industry. A time or place has not yet been determined. Commissioner C. W. Hunt will preside at the meeting.

Machinery Markets and News of the Works

Sales Continue at Fair Rate

Usual Tapering Off at End of Year, However, Is Becoming Apparent

IN view of the unsettled situation which has resulted from the recent deflation of security values, machine tool sales have been fairly good, although the total volume is running somewhat behind that of October.

In this connection, however, it must be remembered that business booked by tool builders usually tapers off during the last two months of the year and that some letdown was apparent even before the stock market collapsed. It is significant that few, if any, cancellations of orders are reported by the industry.

Aside from rather sharp curtailment in radio manufacturing and a less drastic paring down of production in electric refrigerators and one or two other luxury or semi-luxury lines, metal-working plants have not been seriously affected by the stock debacle. Many companies are going ahead with their plans for the future, despite the possibility of some business reaction. It is not unlikely, however, that some machine tool buying that would have been done this year will be postponed until an adequate appraisal of the industrial trend can be made.

Most purchases in the past week have been confined to one or two machines each, but orders in the aggregate have kept the total volume at a moderate level. The Thew Shovel Co., Lorain, Ohio, has an inquiry out for a number of tools. Some business is coming from tire mold makers who are preparing for next year's production.

Deliveries on some lines of tools have shortened, but generally delivery dates still extend well into 1930.

Orders booked in October by members of the National Machine Tool Builders' Association showed a gain of 34 per cent over September, the association's index rising from 240.8 in September to 322.2 in October. The improvement was sufficiently pronounced to turn up again the three months' average index, which now stands at 287. Shipments were heavy during the month, cutting down unfilled orders to less than two and a half times the current rate of shipments.

New York

NEW YORK, Nov. 19.—Aside from rather sharp curtailment in radio manufacturing and a less drastic paring down of manufacturing programs in electric refrigerators and one or two other luxury or semi-luxury lines, the metal-working manufacturing industries of the New York district have not materially been affected by the recent stock market deflation. Machine tool salesmen who have canvassed the situation report that many companies are going ahead with their plans for the future, despite the possibility of some business reaction. Sales of machine tools have fallen off to a marked extent in the past week, and inquiries also are fewer, but in any event some letdown would have been apparent as the year comes to an end.

Records of machine tool sales show that business has nearly always tapered off in the last two months of each year, 1928 having been an exception. In many instances manufacturers have postponed prospective purchases until after Jan. 1, but some of these postponements had been decided upon before the deflation of security values had injected a new element in the situation. No cancellations of orders are reported in this district. Deliveries of some lines of machine tools have shortened moderately, but except for lathes, which are obtainable from some makers in two or three weeks, many delivery dates extend into January or later.

Department of Street Cleaning, Municipal Building, New York, and 68 Hunterspoint Avenue, Long Island City, has plans for one-story equipment storage, service and repair shop at Long Island City, to cost about $150,000 with equipment.

Atlantic Basin Iron Works, Inc., 168 Van Brunt Street, Brooklyn, has awarded general contract to Gibbons Co., 343 Columbia Street, for rebuilding part of plant recently damaged by fire, comprising two-story shop unit, to cost about $45,000 with equipment.

J. E. Kelly & William Cain, 45 South Broadway, Yonkers, N. Y., architects, have filed plans for an automobile service, repair and sales building on South Broadway, to cost $165,000 with equipment.

Richfield Oil Corporation of New York, Inc., Chanin Building, New York, a subsidiary of Richfield Oil Corporation, Los Angeles, Cal., has acquired former storage and distributing plant of Petroleum Terminal Corporation, Bayonne, N. J., for Eastern plant for tank vessels from California properties. Company has also purchased similar plant of Municipal Service Real Estate Co., Inc., Newtown Creek, Brooklyn, for service in that district. Plans are under consideration for extensions and improvements in properties. C. M. Fuller is president of parent organization.

New York City Airport, Inc., care of Lawrence Halleran, Halleran Agency, 63 Broadway, Flushing, L. I., will take bids in about 60 days for airport buildings on field now being established at College Point, L. I., including hangars, machine shop, oil storage and other units, to cost more than $500,000 with equipment.

Paramount Cab Corporation, 730 Fifth Avenue, New York, has leased former Chrysler service station at 637-47 West Fifty-seventh Street, totaling 37,500 sq. ft. floor space, for new service, repair and garage unit for taxicabs, with machine shop and parts department.

A. H. Grebe & Co., 70 Van Wyck Boulevard, Richmond Hill, L. I., manufacturers of radio sets and equipment, parts, etc., has leased additional space in Bush Terminal, First Avenue, Brooklyn, for storage and distribution, releasing space heretofore used at factory for this purpose, and which will be used for increased facilities for manufacture of radio receivers and parts.

Board of Education, Schenectady, N. Y., is considering installation of manual training equipment in three-story high school in Mount Pleasant section, to cost more than $250,000, for which bids are being asked on general contract until Dec. 14. R. L. Bowan, 207 State Street, is architect.

Wilchik & Kline, Inc., New York, manufacturer of paper boxes and containers, has leased floors in building at 190-2 Greene Street, and will occupy for new plant.

Board of Trustees, Industrial Institute of Brooklyn, 26 Court Street, will take bids in about 60 days for new industrial school on 35-acre tract recently acquired at Toms River, N. J., to cost over $100,000 with equipment. Walter S. Schneider, 1757 Broadway, New York, is architect.

Hubeny Brothers, 617 East First Avenue, Roselle, N. J., machinists, have asked bids on general contract for one-story addition to machine shop, to cost close to $25,000 with equipment. W. L. Finne,

1201 East Grand Street, Elizabeth, N. J., is architect.

Salmon Brothers, Netcong, N. J., road contractors, have purchased municipal stone-crushing plant at Newton, N. J., inactive for several years, and will remodel for branch plant, including installation of conveying, loading and other mechanical-handling equipment.

Driver-Harris Co., Middlesex Street, Harrison, N. J., manufacturer of wire products, has authorized construction of power plant for new two and three-story factory group, to cost about $40,000 with equipment. Entire project will cost over $350,000. J. A. Finegan, 776 Broad Street, Newark, is architect.

Spanjer Brothers, Inc., 198 Badger Avenue, Newark, manufacturer of signs and displays, has purchased two-story factory at 267-71 Mount Pleasant Avenue, for new plant to replace former works recently destroyed by fire and which will not be rebuilt at this time, as previously reported.

Thomas A. Edison, Inc., West Orange, N. J., will discontinue manufacture of standard size talking machines and parts, and will use space at plant heretofore given over to such production for manufacture of radio equipment, as well as combination electric talking machines and radio sets. R. R. Karsh is vice-president.

Shell Eastern Petroleum Products, Inc., 122 East Forty-second Street, New York, a subsidiary of Shell Union Oil Co., St. Louis, will soon begin work on oil storage and distributing plant at East Rutherford, N. J., with machine shop, to cost over $140,000 with equipment.

Truscon Steel Co., Youngstown, has opened a new warehouse at Harrison, N. J., 75 x 210 ft. It maintains an office at 605 Broad Street, Newark.

New York Central Railroad Co., 466 Lexington Avenue, New York, has awarded general contract to J. F. Fitzgerald Construction Co., 38 Chauncy Street, Boston, for addition to engine house, with repair facilities, at Utica, N. Y., including improvements in present structures, to cost over $50,000 with equipment. F. B. Freeman is chief engineer.

New England

BOSTON, Nov. 19.—Industrial New England apparently has not felt the recent stock market slump to any appreciable extent. Sales of machine tools have been in fairly good volume. A number of local sellers will make a good November showing, even though orders during the remainder of the month are not large. Orders have come from all parts of the territory. Demand for used tools and small tools has also held up well.

Springfield Bronze & Aluminum Co., Springfield, Mass., will soon start work on a one-story addition, 60 x 82 x 142 ft. A molding department will be installed.

City of South Norwalk, Conn., has plans for a junior high school, with manual training department, to cost $350,000.

Hartford Empire Co., Hartford, Conn., has taken bids for a one-story steel storage building, 40 x 100 ft. Overhead conveying equipment will be required.

Wood Hydraulic Hoist & Body Co., 316 North Beacon Street, Boston, has filed plans for an addition to cost about $25,000 with equipment. Headquarters are at 7924 Riopelle Avenue, Detroit.

Somerville Auto Body Co., 643 Broadway, Somerville, Mass., has plans for one-story factory, 75 x 100 ft., to cost about $45,000 with equipment.

Following acquisition of controlling interest in Indian Motorcycle Co., Springfield, Mass., a few months ago by Charles A. Levine, New York, and associates, ownership has reverted to local group headed by J. Russell Wait, who will again become president of company. Plans for developments in airplane manufacture, as first proposed, will not be carried out, but production will be concentrated on motorcycles and parts, as well as on outboard gasoline engines for boats.

E. W. Carpenter Mfg. Co., Railroad Avenue, Bridgeport, Conn., manufacturer of wire goods, sheet metal stampings, dies, etc., has awarded general contract to Hewlett Co., 886 Main Street, for a one-story addition, 60 x 200 ft., to cost over $50,000 with equipment. Fletcher-Thompson, Inc., 542 Fairfield Avenue, is architect and engineer.

General Box Co., Winchendon, Mass., manufacturer of wire-bound boxes, crates, etc., has plans for a two-story addition, 60 x 160 ft., to cost about $45,000 with equipment. Thompson & Lichtner Co., Inc., Statler Building, Boston, is architect. Headquarters are at 508 North Dearborn Street, Chicago.

Lamb & O'Connell Shipyard, Squantum, near Quincy, Mass., plans rebuilding part of plant recently destroyed by fire.

Officials of Whitin Machine Works, Inc., Whitinsville, Mass., manufacturer of textile machinery and parts, and Oscar Kohorn & Co., Chemnitz, Germany, manufacturers of machinery for rayon mills, have organized Whitin-Koborn, Inc., to produce rayon machinery in United States under Koborn patents. Part of Whitinsville plant will be given over to this line. New company will also arrange for service and repair units in different parts of country for rayon mills using its equipment. E. K. Swift, treasurer and general manager of Whitin company, will be president of new organization; P. K. Uhleman is secretary and treasurer.

The Crane Market

THERE is a fair volume of pending inquiry for locomotive cranes, most of which is from large industrial users. In the past week the Tidewater Oil Co., New York, has closed on a 25-ton locomotive crane with the Browning Crane Co. In the overhead crane field there is a tendency on the part of buyers to postpone action until they feel that the future trend of business is more definitely determined. These prospective buyers are, as a rule, maintaining a fair rate of operation, although somewhat less than in the first half of the year. The Phoenix Utility Co., 71 Broadway, New York, has a 25-ton, 1-motor, overhead crane to buy and the Standard Oil Co. of New Jersey is inquiring for a 3-ton hand power crane for export.

In the Pittsburgh district a number of crane orders have been placed, but new business has declined rather sharply since the first of the month. The Westinghouse Electric & Mfg. Co., East Pittsburgh, is inquiring for six 3-ton to 5-ton electric traveling cranes.

Among recent purchases are:

Roger Daoust, Defiance, Ohio, gasoline operated crawl-tread crane from Orton Crane & Shovel Co.

Keeport Stone & Lime, Inc., Logansport, Ind., 22-ton, steam operated locomotive crane from Orton Crane & Shovel Co.

H. D. Conkey & Co., Mendota, Ill., report the following recent orders for overhead equipment: National Carbide Corporation, Keokuk, Iowa, 5-ton, 38-ft. span, 3-motor crane; Dallas Brass & Copper Co., Chicago, 6-ton, 27-ft. 6-in. span transfer crane; Kansas City, Kan., 5-ton, 27-ft. 10-in. span hand power crane; Consolidated Paper Co., Monroe, Mich., 10-ton, double girder hand power crane; General Alloys Co., Champaign, Ill., 5-ton, 46-ft. 10-in. span, 3-motor, double girder crane; Buckeye Coal Co., Nemasolin, Pa., 5-ton, 23-ft. 6-in. span hand power crane; Truscon Steel Co., Youngstown, 2-ton, 35-ft. span single I-beam electric crane; Sauerman Brothers, Chicago, 10-ton, 27-ft. 4½-in. span, double girder electric crane and 1½-ton mast type jib crane; Penn Railroad Co., Crestline, Ohio, 10-ton, 37-ft. span single I-beam electric crane; Roanoke Webster Brick Co., Webster, Va., 8-ton, 18-ft. span hand power crane.

Philadelphia

PHILADELPHIA, Nov. 18.—Morris, Wheeler & Co., Inc., Roberts Avenue and Pennsylvania Railroad, Philadelphia, iron and steel products, has awarded general contract to McCormick-Lenham Co., Fortieth and Chestnut Streets, for one-story storage and distributing plant, to cost about $30,000 with equipment.

Bachmann Brothers, 609 Commerce Street, Philadelphia, manufacturers of celluloid products, have plans for a new factory, to cost over $70,000 with presses and other equipment. Eugene A. Stopper, Fuller Building, is architect.

General Steel Castings Co., Eddystone, Pa., has begun work on new building, 60 x 200 ft., for general operating service, for which contract recently was let to Wark Co., 1608 Walnut Street, to cost $125,000. Simon & Simon, Fidelity Building, are architects.

Edward G. Budd Co., Twenty-fifth Street and Hunting Park Avenue, Philadelphia, manufacturer of steel automobile bodies, has awarded general contract to Wark Co., 1608 Walnut Street, for one-story manufacturing unit, to cost about $20,000 with equipment.

Board of Education, Paulsboro, N. J., is considering installation of manual training equipment in new three-story high school to cost about $300,000, for which plans are being drawn by Edwards & Green, 548 Federal Street, Camden, N. J., architects.

City Commission, City Hall, Trenton, N. J., will receive bids until Nov. 29 for pumping machinery, piping, valves, etc., for pumping plant on Clearfield Avenue. Leon D. Hirsch is city clerk.

Charles J. Schlemer, 232 North Charlotte Street, Lancaster, Pa., and associates have organized Multivane Blower & Electric Co., and will operate local plant for manufacture of heat-regulating devices and equipment, mechanical blowers, parts, etc. Chester W. Bowman, Lancaster, is also interested in new company.

Lebanon Steel Foundry Co., Lebanon, Pa., has awarded general contract to Hughes-Foulkrod Co., 1515 Race Street, Philadelphia, for two-story foundry addition, 150 x 182 ft., to cost $100,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers. W. H. Worrilow is president.

Chamber of Commerce, Coatesville, Pa., has authorized purchase of 120-acre tract on Lincoln Highway for new municipal

airport, to include hangars, repair shop and other field units, to cost more than $75,000.

Board of Education, Keystone Building, Philadelphia, is asking bids until Dec. 3 for vises, etc., as per list on file at office of Edward Merchant, secretary and business manager.

Cochrane Brass Foundry, Boll and Spahn Avenues, York, Pa., is completing construction of new one-story foundry unit, 60 x 120 ft., to cost more than $30,000 with equipment.

Allis-Chalmers Mfg. Co., Milwaukee, has appointed T. B. Wood's Sons Co., Chambersburg, Pa., special distributer of Texrope drives. A large stock of drives and belts will be carried at Chambersburg.

South Atlantic

BALTIMORE, Nov. 18.—Baltimore Copper Smelting & Rolling Co., Canton, Baltimore, has awarded general contract to Herbert J. West, Knickerbocker Building, for a one-story addition, to cost about $35,000 with equipment.

Baltimore Airways, Inc., Edward Handler, Calvert Securities Corporation, 32 South Calvert Street, Baltimore, president, is planning construction of four hangars, with reconditioning and repair facilities, at airport on Park Heights Boulevard, to cost more than $85,000 with equipment; other field units are also proposed. Company is arranging for sale of 50,000 shares of common stock, part of fund to be used for expansion.

Baugh Chemical Co., 25 South Calvert Street, Baltimore, has plans for a one and two-story commercial fertilizer manufacturing plant, to cost about $100,000 with conveying and other equipment. W. H. Ulrich is company engineer.

Wicomico County Board of Education, Salisbury, Md., has authorized installation of manual training equipment in new three-story high school to cost about $300,000, for which bids will be asked soon on general contract by Smith & May, Calvert Building, Baltimore, architects.

Richmond Engineering Co., Richmond, Va., plans rebuilding part of metal-working shop destroyed by fire Nov. 9.

Nantahala Co., recently organized, has purchased properties of North Carolina Talc & Mining Co., Hewitts, N. C., consisting of 8000-acre tract in Nantahala Gorge district, and plans installation of works for mining of soapstone, limestone, talc and kindred products.

Old Dominion Anthracite Coal Corporation, Pulaski, Va., is considering rebuilding electric power plant at properties about 8 miles from city, recently partially destroyed by fire.

American Tobacco Co., 111 Fifth Avenue, New York, plans installation of elevating, conveying and other material-handling equipment in five new storage and distributing plant at Durham, N. C., for which general contract has been let to Fiske-Carter Construction Co., Greenville, S. C., to cost about $500,000. Company is also building similar units at Reidsville, N. C., to cost more than $250,000.

Schofield Co., 2 East Saratoga Street, Baltimore, manufacturer of silverware, metal plated goods, etc., has leased four-story plant to be erected at 3-7 East Pleasant Street, for which general contract has been let to Consolidated Engineering Co., 20 East Franklin Street, to cost about $45,000.

Norfolk Radiator Works, Inc., 160 West Olney Road, Norfolk, Va., manufacturer of automobile radiators and equipment, has awarded general contract to Nichols & Lindemann, Norfolk, for one-story plant, to cost about $30,000 with equipment. Neff & Thompson, Seaboard Bank Building, are architects. A. C. Martens is head.

Chain Belt Co., Milwaukee, has appointed following new distributers in Southeast for Rex chains and transmission equipment: Bailey-Lebby Co., Charleston, S. C.; Georgia Supply Co., Savannah, Ga., and Jacksonville, Fla.; Harry P. Leu Co., Orlando, Fla.; J. M. Tull Rubber & Supply Co., Atlanta, Ga.

High Point Machine & Mfg. Co., High Point, N. C., has been organized with capital of $100,000 to do a general machine shop and foundry business on site formerly occupied by High Point Machine Works. Company will manufacture gray iron, aluminum, bronze and boiler room castings and a few special machines, including a line of clamps for furniture factories.

Pittsburgh

PITTSBURGH, Nov. 18.—Business is slowing down somewhat and the volume of new inquiries is generally reported to be somewhat lighter. Purchases of single tools are being made from day to day, but some buyers are more cautious and a few have definitely postponed action on present inquiries until after the first of the year. Awards have not yet been announced on the Pittsburgh Board of Education's recent list, although bids closed some time ago. The United States Aluminum Co., New Kensington, Pa., has taken no action on a supplementary list of tools for which inquiries were sent out some time ago, but the Westinghouse Electric & Mfg. Co., East Pittsburgh, is closing regularly against its fourth quarter list. The Bethlehem Steel Co. has yet to place some tools for its Johnstown plant.

The effect of the recent stock market collapse on the machinery business is not yet fully apparent, but most local dealers are of the opinion that the trade will feel adverse influences over the remainder of the year. However, the year thus far has been extremely active and machinery and equipment builders in this and nearby districts have large backlogs of orders.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has plans for initial unit of Eastern factory branch and distributing plant in meadow district, Newark, N. J., to be two stories, totaling 150,000 sq. ft. floor space, to cost about $500,000 with equipment. Bernard H. Prack, Martin Building, Pittsburgh, is architect.

Keystone Metal Specialties Co., recently formed by James K. Ruby, 1306 Park Avenue, McKeesport, Pa., and associates, plans operation of plant at Pittsburgh for manufacture of sheet metal products. James G. Fulton, 2850 Espy Avenue, Dormont, Pa., is interested in new organization.

Ingram-Richardson Mfg. Co., Beaver Falls, Pa., manufacturer of sheet steel and cast iron enameled products, has awarded general contract to Leroy Freed Co., 1211 Seventh Avenue, for one-story addition, 35 x 100 ft., to cost over $35,000 with equipment.

Duquesne Light Co., 435 Sixth Avenue, Pittsburgh, is planning for pumping plant and water-treating station at generating plant at Brunot Island, to cost $290,000 with machinery.

Mutual Telephone Co., 24 East Tenth Street, Erie, Pa., has closed bids on general contract for one and two-story equipment storage and distributing plant, with electrical and mechanical repair departments, and automobile service and repair shop, to cost $175,000 with equipment. Myers & Johnson, Commerce Building, are architects.

Loudon School District, Charleston, W. Va., plans installation of manual training equipment in high school at South Charleston, to cost $250,000, and junior high school at Marmet, W. Va., to cost $100,000. Bond election has been called on Dec. 10, and architect will be selected immediately thereafter.

Aviation Committee, Chamber of Commerce, Clarksburg, W. Va., is considering purchase of 40-acre tract on Buckhannon Road for city airport, to include hangars, repair shop and other structures, to cost more than $75,000 with equipment. J. M. Carskadon is chairman of committee.

William B. Scaife & Sons Co., range boiler and steel tank manufacturers, Pittsburgh, has recently completed a large warehouse for storing galvanized products.

Detroit

DETROIT, Nov. 18.—American Forging & Socket Co., Branch Street, Pontiac, is considering new plant comprising several one-story units, to cost about $150,000 with equipment.

American Oil & Grease Corporation, Jackson, is planning to rebuild part of plant recently destroyed by fire, with loss more than $100,000 including equipment.

Checker Cab Mfg. Co., Gibbons Street, Kalamazoo, manufacturer of taxicabs, will soon begin superstructure for one and two-story addition, primarily for automobile body manufacture, to cost more than $350,000 with equipment.

Copeland Products, Inc., 630 Lycaste Street, Detroit, manufacturer of electric refrigerating equipment, is arranging for early removal of plant to new buildings at Mount Clemens, Mich., where production will be concentrated and capacity increased.

Consumers Power Co., Jackson, will erect two-story addition to steam-operated electric generating plant at Kalamazoo, to cost over $150,000 with equipment. Stevens & Wood, Inc., 20 Pine Street, New York, is consulting engineer.

Clarke Sanding Machine Co., 3815 Cortland Street, Chicago, manufacturer of vacuum portable sanding machines and parts, has awarded general contract to Strom Construction Co., Muskegon, Mich., for one-story plant at last-noted place, totaling about 38,000 sq. ft. floor space, to cost more than $75,000 with equipment. Company will remove present plant to Muskegon, where production will be increased and concentrated. L. G. Hallberg, 116 South Michigan Avenue, Chicago, is architect.

Wood Hydraulic Hoist & Body Co., 7924 Riopelle Avenue, Detroit, has awarded general contract to Otto Randolph, Inc., 59 West Jackson Boulevard, Chicago, for one-story addition, 80 x 190 ft., to cost about $70,000 with equipment.

Lakey Foundry & Machine Co., Muskegon, is said to be arranging for rebuilding part of plant recently destroyed by fire.

O. L. Anderson Co., Inc., 1347 East Fort Street, Detroit, manufacturer of metal stampings, automobile gasoline tanks, etc., is contemplating one-story plant unit on site recently acquired, to cost about $70,000 with equipment.

Board of Education, Ypsilanti, plans installation of manual training equipment in new junior high school to cost $750,000, for which general contract has been let to R. S. Knapp Co., 15518 Idaho Street, Detroit. R. S. Gerganoff, Ypsilanti, is architect.

Briggs Commercial & Development Co., Buhl Building, Detroit, has plans for a new multi-story automobile service, repair and garage building at Pontiac, to cost more than $100,000 with equipment. A similar structure is planned at Detroit to cost close to like sum. Charles Kotting, Dime Bank Building, Detroit, is architect for both structures. Company also has plans for another such automobile building at Detroit, to cost more than $125,000 with equipment. O'Dell & Diehl, Donovan Building, Detroit, are architects for last-noted unit.

Chicago

CHICAGO, Nov. 18.—Activity in the local machine tool market has subsided somewhat from the rate of a week ago, the change being more noticeable in inquiries than in orders. Railroads are still taking figures for budget use, and several lines have intimated that 1930 purchases of machine tools will be heavy. A local steel mill after paring down its list has placed a 24-in. shaper and an 18-in. x 12-ft. and a 30-in. x 14-ft. lathe, and will buy five or six additional items. A local embossing press manufacturer has ordered a 48-in. planer.

Several farm implement makers have placed orders for machine tools. A Chicago jobbing shop plans to replace nine machine tools and the Great Northern Railroad will take prices on 15 tools, the majority of which are woodworking. Additional inquiries are expected from farm machinery manufacturers in Illinois, Iowa and Michigan. Shops, with the exception of those operated by radio manufacturers, remain busy. Nash Motors Co., after curtailing output last week, is now increasing production.

Belden Mfg. Co., 4625 Van Buren Street, Chicago, manufacturer of insulated wire and cable, has filed plans for a two-story building, 68 x 132 ft., to cost $60,000. A. S. Coffin, 6 North Michigan Avenue, is architect.

Allis-Chalmers Mfg. Co., West Allis, Wis., tractor division, has plans for one-story addition to plant at Springfield, Ill., to cost about $135,000 with equipmen.

Grigsby-Grunow Co., 2038 North Kolmar Avenue, Chicago, manufacturer of radio equipment and parts, has awarded general contract to H. Ericcson Co., 674 North La Salle Street, for three-story addition, 260 x 300 ft., to cost about $750,000 with equipment. Graham, Anderson, Probst & White, 80 East Jackson Boulevard, are architects. Company has also let contract to same company for two-story addition, 80 x 680 ft., to plant on Dickens Avenue, recently acquired, to cost more than $500,000 with equipment, for which plans were drawn by Holabird & Root, 333 North Michigan Avenue, architects.

Metz Mfg. Co., Seventeenth and Elm Streets, Dubuque, Iowa, manufacturer of sash, doors, etc., has awarded general contract to R. F. Conlon, Federal Bank Building, for three-story and basement addition, 80 x 130 ft., to cost about $60,000. C. I. Krajewski, 730 Main Street, is architect.

Colorado Fuel & Iron Co., Pueblo, has authorized electrification of mining properties at Crested Butte, Colo., including installation of additional equipment, to cost $175,000.

City Council, Watertown, S. D., is considering installation of a municipal electric light and power plant, to cost close to $100,000 with equipment.

Hume Pipe Corporation, Room 910, 100 West Monroe Street, Chicago, manufacturer of steel reinforced concrete pipe, is considering new plant at Arlington Heights, Ill., with main unit one-story, 75 x 165 ft., to cost about $115,000 with equipment. J. A. Dunn, Evanston, Ill., is vice-president and general manager.

Great Northern Railway Co., Railroad Building, St. Paul, Minn., has awarded general contract to Pappin & Dudley, Great Falls, Mont., for additions to local shops, including one-story car repair shop and mill, 115 x 600 ft., to cost about $50,000, and one-story wheel shop, 50 x 70 ft., to cost about $25,000 with equipment. T. D. McMahon is company architect, address noted.

Atchison, Topeka & Santa Fe Railroad Co., Topeka, Kans., has awarded a general contract to W. A. Smith Co., Fort Madison, Iowa, for extensions in engine house and repair shops at Shopton, Iowa, to cost $60,000 with equipment.

Public Service Co. of Colorado, Denver, is arranging an expansion program for 1930 to cost over $2,500,000. Work will include extensions in steam-operated electric power plants at Sterling, Grand Junction, Alamosa and other localities, to cost $700,000 with equipment, and an addition to the Valmont generating station near Boulder, to cost about $500,000 with machinery.

Sundstrand Engineering Co. has acquired a one-story factory at Harrison Avenue and Ninth Street, Rockford, Ill., with 10,000 sq. ft. floor space and will center all activities there. Company is planning expansion of its oil burner production.

Buffalo

BUFFALO, Nov. 18.—Union Carbide & Chemical Corporation, Niagara Falls, N. Y., plans expansion at local works for increase in production of carbide. Manufacture of ferroalloys will be transferred to plant of subsidiary at Glen Ferris, W. Va., where increased facilities will be arranged. Company will also carry out hydroelectric power development in last-noted State. Work will form part of a general development program to cost over $25,000,000. Headquarters are at 30 East Forty-second Street, New York.

Vanott Machine Corporation, Buffalo, recently organized by Thomas J. Mingovan, 174 Whitfield Avenue, and associates, with capital of $75,000, plans operation of local factory to manufacture machinery and parts. Vincent Schiavi, 559 McKinley Parkway, is also interested in new company.

Penn Yan Boat Co., Liberty Street, Penn Yan, N. Y., has plans by L. A. Harding Construction Corporation, 1335 Main Street, Buffalo, for addition to boat-building and repair plant, to cost about $135,000 with equipment. It is understood that construction company noted will receive general contract.

Union Free High School District No. 1, East Aurora, N. Y., is considering installation of manual training equipment in addition to high school, to cost $325,000, for which plans will be drawn by A. H. Merritt, Erie County Bank Building, Buffalo, architect.

Cleveland

CLEVELAND, Nov. 18.—Considering the unsettled situation that has resulted from the collapse of stock market prices, machine tool business held up quite well the past week. A fair volume of sales in single machines was well distributed among metal-working industries. Deliveries of some tools have been deferred, but there have been practically no cancellations. The Thew Shovel Co., Lorain, Ohio, has an inquiry out for a number of machines, and the Industrial Brownhoist Corporation, Cleveland, is considering the purchase of a few tools.

Some business is coming from the Akron district where tire mold manufacturers are preparing for 1930 production. One purchase in this field was a boring mill by a Cuyahoga Falls plant. Buying by the automotive industry in the Michigan territory is almost at a standstill. Deliveries on some lines show a gain of two weeks, but others have not improved.

Brainard Steel Co., Warren, Ohio, contemplates enlargement of its plant, quadrupling present capacity. Plans call for construction of two factory buildings and an office building, to cost about $300,000.

Cleveland office of William K. Stamets has been moved to larger quarters at 462-464 Rockefeller Building. George D. Miller is Cleveland district manager. Mr. Stamets has been appointed sales representative in northern Ohio for Andrew C. Campbell, Inc., manufacturer of Campbell nibblers.

Truscon Steel Co., Youngstown, Ohio, manufacturer of standard steel buildings, steel sash, etc., is arranging for expansion at local mill, including new buildings and equipment, to cost about $500,000. Julius Kahn is president.

W. R. Hopkins, City Hall, Cleveland, city manager, has awarded general contract to Gilchrist Construction Co., Western Reserve Building, for one-story municipal automobile service, repair and garage building, 80 x 180 ft., to cost $100,000 with equipment.

B. F. Goodrich Rubber Co., Akron, Ohio, will carry out expansion at branch mill at Los Angeles, including new buildings and equipment, to cost about $250,000.

Electric Power & Maintenance Co., Monroe and Eleventh Streets, Toledo, Ohio, has plans for one and two-story automobile repair, service and electrical shop, to cost about $50,000 with equipment. Langdon, Hohly & Gramm, Security Bank Building, are architects.

Union Malleable Mfg. Co., Ashland, Ohio, manufacturer of pipe, pipe fittings, etc., has purchased for expansion local mill of Ashland Tire & Rubber Co., consisting of group of buildings on 4-acre tract.

Timms Spring Co., Buckeye Street, Elyria, Ohio, manufacturer of wire

springs and other wire specialties, is considering rebuilding part of plant destroyed by fire Nov. 9.

Duncan Oil Refining Co., Youngstown, plans rebuilding part of refinery destroyed by fire Nov. 9.

Columbia Metal Stamping & Die Co., Cleveland, manufacturer of parts for automobiles, radios and electrical appliances, has purchased a plant now being constructed at East 116th Street and Harvard Avenue from Harold K. Ferguson, president of H. K. Ferguson Co., Cleveland. About $50,000 will be expended in new equipment for plant, which will add 21,000 sq. ft. to floor space of company. Fred C. Koch is president.

St. Louis

ST. LOUIS, Nov. 18.—Railroads centering in St. Louis are expected to come into the market shortly after the first of the year for their 1930 machine-tool requirements. From contacts with purchasing agents, manufacturers' representatives get the impression that the lists will be larger than in 1929, but that there will be few, if any, heavy tools purchased. Missouri Pacific is in the market for a heavy-duty tire turning lathe.

Missouri Boiler & Sheet Iron Works, 908 South Twenty-third Street, St. Louis, has arranged for purchase of adjoining property for expansion, particularly in tanks and kindred plate products.

Wood Brothers, Inc., Kansas City, Mo., manufacturer of aircraft and parts, will soon take bids on general contract for one-story plant at Rosecrans Field, St. Joseph, Mo., for parts manufacture and assembling, to cost over $300,000 with equipment. C. A. Smith, Finance Building, Kansas City, is architect.

Clay & Bailey Mfg. Co., Kansas City, Mo., manufacturer of tank and drum fittings and other iron and steel products, operating Morgan Foundry Co., Kansas City, has engaged Stephen C. Kenney, Gumbel Building, architect, to prepare plans for plant on 3½-acre tract recently acquired. Initial units will be one-story, about 60 x 120 ft., and will be used for foundry, machine shop, storage and other units, entire project to cost more than $90,000 with equipment.

Grand Hydro-Electric Corporation, Tulsa, Okla., recently organized by Philip Ball, Security Building, St. Louis; W. E. Hudson, Tulsa, and associates, has plans for hydro-electric generating plant on Grand River, Mayes County, taking over power site and property heretofore held by W. E. Hudson, now affiliated with new company. Plant will have ultimate output of 400,000 hp., with initial station approximating one-fourth of this sum, to cost more than $500,000 with transmission system.

City Council, Lincoln, Neb., will soon take bids for equipment for municipal electric light and power plant, including boilers, stokers, economizers, superheaters, etc., to cost about $50,000. D. L. Erickson is engineer. Theodore H. Berg is city clerk.

Southern Air Service, Inc., Tulsa, Okla., has leased three-story building at 205 South Cheyenne Avenue, and will establish branch for Nicholas-Beasley Corporation, Marshall, Mo., manufacturer of airplanes and parts, including service, repair and parts building. A flying school is planned. Entire project will cost more than $70,000.

City Council, Concordia, Mo., has plans for municipal electric light and power plant, to cost about $50,000 with equipment. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are engineers.

Carter Carburetor Co., 2838 North Spring Ave., St. Louis, is erecting a third-floor factory addition containing about 13,000 sq. ft. floor space, which will increase present production 50 per cent.

Star Mfg. Co., Inc., St. Louis, manufacturer of popcorn machines and electric grills, has moved from 4477 Finney Avenue to 4569 Swan Avenue, increasing its floor space from 4000 to 12,000 sq. ft.

Cincinnati

CINCINNATI, Nov. 18.—Inquiry for machine tools continues fairly brisk, but buyers seem to be displaying more caution in placing orders after receiving quotations. One leading interest indicates that fresh bookings last week were unusually light. Despite this slackening in demand prospects are good, with inquiry remaining level. There is a noticeable increase in requests from Canada and the Pacific Coast for quotations. Production is being maintained at a high level and manufacturers expect that present schedules will be maintained well into next year.

Procter & Gamble Co., Gwynne Building, Cincinnati, has approved plans for new plant at Memphis, Tenn., to be operated by Buckeye Cotton Oil Co., a subsidiary, to cost about $1,000,000 with machinery.

William Powell Co., 2521-25 Spring Grove Avenue, Cincinnati, manufacturer of valves, engineering specialties, etc., will soon take bids on general contract for two-story addition, to cost about $55,000 with equipment. Teitig & Lee, Merchants' Building, are architects. H. E. Coombe is vice-president and general manager.

Traveling ovens, power equipment, conveying and other machinery equipment will be installed in new plant, 150 x 200 ft., to be erected by Colonial Baking Co., Memphis, Tenn., to cost $320,000. Majority of equipment will be electrically operated.

Holophane Glass Co., Newark, Ohio, has plans for an addition, to include tank house, installation of two furnace units, and auxiliary equipment, to cost about $80,000 with machinery.

Auto Rotary Lift Co., 1055 Kentucky Street, Memphis, Tenn., has awarded general contract to John F. Schwitzer, 591 North Third Street, for one-story plant, 50 x 150 ft., to cost about $22,000 with equipment.

Memphis Natural Gas Co., Memphis, Tenn., is considering construction of pipe line from Memphis to Covington, Brownsville, Dyersburg and vicinity, to cost more than $100,000 with booster stations.

Edward R. Edwards and associates have formed Edwards Engineering Co., Niles, Ohio, to manufacture a special steel loading and unloading device, the invention of Mr. Edwards. One of these machines has been in successful operation for five months at plant of Mahoning Valley Steel Co. at Niles.

Gulf States

BIRMINGHAM, Nov. 18.—National Portland Cement Co., Santa Fe Building, Dallas, Tex., has purchased river front property at Vicksburg, Miss., including quarry lands, as site for new cement mill with daily capacity of 3500 bbl. Project will include steam power house, machine shop and other units, and will cost over $1,000,000 with machinery. Equipment will be purchased early next year.

White Packing Co., Parallel Street, Montgomery, Ala., meat packer, has plans for new two-story unit, with refrigerating department, lard refinery and other units, to cost about $200,000 with equipment. H. Peter Henschien, 1637 Prairie Avenue, Chicago, is architect and engineer.

Gulf Pipe Line Co., Fort Worth, Tex., a subsidiary of Gulf Oil Corporation, Fort Worth, with headquarters in Frick Annex, Pittsburgh, has taken title to property near Lucas, Tex., and plans construction of oil storage and distributing plant, to cost $125,000 with equipment, including pipe line facilities.

Taylor Link Oil Co., San Angelo Bank National Bank Building, San Angelo, Tex., is considering construction of carbon black manufacturing plant near Girvin, Tex., to cost over $75,000 with equipment.

Board of Education, Lubbock, Tex., is considering installation of manual training equipment in new two and three-story high school to cost $650,000, for which bids will be asked at once on general contract by Peters, Strange & Bradshaw, Myrick Building, architects.

Landreth Petroleum Co., McCamey, Tex., has begun construction of oil storage and distributing plant in Upton County, to cost more than $150,000 with tanks, pumping machinery, etc. A similar plant is planned in Pecos County.

Alford Pure Milk & Ice Co., 819 South Presa Street, San Antonio, Tex., has plans for immediate construction of one-story ice-manufacturing plant at Mercedes, Tex., to cost about $70,000 with machinery.

International Harvester Co., 606 Soutn Michigan Avenue, Chicago, has plans for one and two-story factory branch and distributing plant at Sweetwater, Tex., 100 x 100 ft., and 100 x 500 ft., with part given over to assembling department, to cost over $100,000 with equipment. W. D. Price is company architect.

Merchants Ice & Cold Storage Co., 1306 East Houston Street, San Antonio, Tex., has plans for addition to cold storage and refrigerating plant, to cost about $125,000 with machinery. W. E. Simpson Co., Milam Building, is engineer.

Maverick County Water Improvement District No. 1, Eagle Pass, Tex., has plans for a hydroelectric power plant on Rio Grande River, in connection with irrigation system, for which permission has been asked from State Board of Water Engineers. Generating station will include transmission system, and will cost $1,000,000.

Ford Motor Co., Detroit, is planning an addition to branch assembling plant at Houston, Tex., to cost about $50,000 with equipment.

Oklahoma Natural Gas Co., 112 North Broadway, Oklahoma City, Okla., plans one-story mechanical repair and equipment shop at San Angelo, Tex., to cost about $40,000.

Milwaukee

MILWAUKEE, Nov. 18.—Inquiry continues in good volume, although there has been some recession in orders for machine tools, but not enough to lower business below last year's mark at this season. Deliveries have improved but slightly. Orders cover a wide range of industries but are mostly for small lots. Cancellations have not exceeded the normal number and none is attributed to the situation in the securities market. Several large lists are being awaited from manufacturers of excavating equipment, cranes, marine motors and gasoline engines. Automobile production is picking up slightly. Some manufacturers of agricultural implements, with more orders than at this time last year, announce plans for expansion of production facilities.

Curtiss Airport Corporation, 27 West Fifty-seventh Street, New York, has awarded contract to Hunzinger Construction Co., 144 East Wells Street, Milwaukee, for service building and hangar, 122 x 145 ft., at newly acquired airport at Granville, Wis.

Spring City Foundry Co., 901 West St. Paul Avenue, Waukesha, Wis., is building a shop addition, 55 x 65 ft.

Kimberly-Clark Co., Neenah, Wis., is taking bids for addition to finishing room, 122 x 127 ft., and paper storage and crate shop, 148 x 276 ft., to cost over $150,000. O'Keefe-Orbison Engineering & Construction Co., 201 East College Avenue, Appleton, Wis., is engineer.

Western Printing & Lithographing Co., Racine, Wis., has appointed Austin Co., Cleveland, to design an addition to plant at 1212 Mound Avenue, to cost $100,000. R. A. Spencer, vice-president, is in charge.

West Side Mfg. Co., 3100 Walnut Street, Milwaukee, millwork manufacturer, has appointed Klug & Smith, Mack Block, engineers, to design three-story addition, 114 x 138 ft., to cost about $100,000 including equipment. Edward Schildknecht, president-treasurer, is in charge.

Board of Industrial Education, West Allis, Wis., has let contract to Pfeifer Construction Co., West Allis, for third unit of Vocational Training School, to be three stories, 40 x 57 ft.

Indiana

INDIANAPOLIS, Nov. 18.—Bids will be received until Dec. 10 by Board of Trustees, Indiana Soldiers and Sailors Orphans' Home, Knightstown, Ind., for power plant to cost over $125,000 with equipment. McGuire & Shook, 941 North Meridian Street, Indianapolis, are architects.

Board of Trustees, Notre Dame University, South Bend, is considering a new multi-story mechanical engineering building on campus, to cost more than $400,000 with equipment.

Great Atlantic & Pacific Tea Co., 209 West South Street, Indianapolis, with headquarters at 420 Lexington Avenue, New York, has leased three-story building, 105 x 400 ft., now in course of construction on South State Avenue, for baking plant and factory branch for storage and distribution, installation to include ovens, power machinery, conveying, loading and other equipment. It will cost about $260,000, and is scheduled for occupancy in January.

Board of Trustees, Milwaukee School of Engineering, Milwaukee, is considering establishment of branch school at Indianapolis, with facilities for instruction in electrical and mechanical engineering.

Pacific Coast

SAN FRANCISCO, Nov. 14.—Plans are being considered by Minerals Increment Co., Los Angeles, care of J. Ralph McInerny, 1400 East Sixth Street, president, for new plant at Pittsburg, Cal., where 6-acre tract has been secured, for production of new light metal for aircraft construction, for which rights to German patents have been secured. Initial plant will cost about $200,000 with equipment.

Aeronautical Corporation, San Diego, Cal., T. Claude Ryan, president, has applied for permission to lease part of tidelands as site for plant to manufacture airplanes, including parts, and assembling departments. Initial units will cost about $120,000 with equipment.

Western Sugar Refining Co., 2 Pine Street, San Francisco, has awarded general contract to Barrett & Hilp, 918 Harrison Street, for one and two-story addition, 140 x 320 ft., for storage and distributing plant, to cost about $250,000 with mechanical-handling and other equipment. H. J. Brunnier, Sharon Building, is architect.

City Council, Seattle, is considering construction of municipal cold storage and refrigerating plant at Smiths Cove, consisting of four two-story units, 90 x 420 ft., to cost about $400,000 with equipment. City engineering department will be in charge.

Clift Motor Co., 1104 Central Avenue, Bellingham, Wash., is planning two-story machine, welding and pattern shop, 50 x 110 ft., to cost about $22,000 with equipment.

DeMartini Motor Truck Co., 435 Pacific Street, San Francisco, is considering early rebuilding of part of plant recently destroyed by fire.

Pacific Iron & Steel Co., 241 East Avenue 26, Los Angeles, operating a general fabricating works, has purchased 22-acre tract at Compton, as site for new plant, to cost about $250,000 with equipment. It is understood that present works will be removed to new location. Company engineering department is in charge.

Empire Refining Co., Signal Hill oil district, near Long Beach, Cal., is considering rebuilding part of refinery recently destroyed by fire.

Rickard Anti-Friction Brake, Inc., 1202 East Artesia Street, Bellflower, Cal., has been organized with capitalization of $100,000 to manufacture brakes for automobiles, trucks, elevators, oil wells, hoists and other appliances. Actual manufacture will be done by subsidiary companies which are in process of organization and which will need materials and equipment. Parent company will confine itself exclusively to designing models and perfecting patent. A. D. Boone is secretary.

Canada

TORONTO, Nov. 18.—Although no lists for machine tools have been issued recently, demand for single tools is fairly steady. Business as a whole is better than a year ago and prospects indicate that trade for the remainder of the year will be in fairly good volume. Industrial plant construction is holding at a good level with a number of large companies either erecting plants or additions or having plans prepared for early erection. Many machine tool builders have a good volume of unfilled business.

Houdaille Engineering Corporation, 537 Delaware Avenue, Buffalo, N. Y., is considering establishment of a plant at Bridgeburg, Ont., on which construction will start next spring. Harold Lighthart, Fort Erie, Ont., is interested.

Nichols Copper Co., 25 Broad Street, New York, is planning erection of a copper refinery near Montreal.

United Mfg. Co., has awarded general contract to Charles Page Construction Co., Three Rivers, Que., for erection of a plant at Cap de la Madeleine, Que., to cost $60,000.

St. Mary's Cement Co., St. Mary's, Ont., has started work on a plant addition.

Regina Sash & Door Co., 3300 Railway Street, Regina, Sask., has awarded contract to Shoquist Brothers, 211 Duchess Street, Saskatoon, for a one-story factory, 100 x 490 ft., at Saskatoon, to cost $150,000.

Foreign

NEGOTIATIONS have been concluded by Yale & Towne Mfg. Co., Stamford, Conn., manufacturer of locks, builders' hardware, chain hoists, etc., for purchase of H. & T. Vaughan, Ltd., Willenhall, England, manufacturer of similar products, with factory branch and distributing plant at London. Purchasing company will consolidate with organization, operating as subsidiary unit. Present plants will be continued and expansion in output is planned.

Compagnie Industrielle des Petroles, Paris, France, a subsidiary of Vacuum Oil Co., 61 Broadway, New York, is consiiding new oil refinery in France, to cost more than $600,000 with equipment.

Ford Motor Co., Detroit, is reported to have concluded arrangements for purchase of site at Gdyniawith, Poland, for new assembling plant to cost more than $650,000 with equipment.

Société Francaise Recherches au Venezuela, Paris, France, known as "Recherches," is completing plans for extensive oil operations in Venezuela. Three producing wells will be established in Mene Grande, Mara and Urdaneta districts, near Lake Maracaibo, and storage and distributing facilities constructed. Plans have been drawn for a pipe line from plants to Lake Maracaibo for loading on tankers. Company has recently increased capital to 60,000,000 francs (about $2,200,000), part of proceeds to be used for project. Société de Prospection de Petrole et de Mineraux par les Procedes Geophysiques, Paris, known as "P. P. G." is also interested in enterprise and will be affiliated in pipe line construction.

Firestone Tire & Rubber Co., Akron, Ohio, is planning expansion at mill at Brentford, near London, England. Harvey S. Firestone, Jr., vice-president, and E. A. Hoener, chief engineer, have left for that place and will arrange details.

A new company has been organized at Manila, P. I., by local interests to construct and operate a mill for the manufacture of mechanical rubber goods, using native-grown rubber as raw material. Equipment purchases will be made at once in United States. Information at office of Bureau of Foreign and Domestic Commerce, Washington, reference Philippines No. 96090.

New Trade Publications

Milling Machines in Aircraft Work.—Kearney & Trecker Corporation, Milwaukee. Booklet of 24 pages under title of "Milling Faster for an Industry That Flies," illustrates several applications of the company's machines on airplane engine parts.

Speed Reducers.—Ohio Gear Co., 1333 East 179th Street, Cleveland. Catalog No. 29-A, giving horsepower ratings and dimensions of small worm-gear speed reducers. Timken roller bearings are used, and the hardened worms are ground all over, including the thread. Cases are of semi-steel, with ample reservoir for oil.

Lathe and Drill Chucks.—Westcott Chuck Co., Oneida, N. Y. Leaflet of four pages.

Centrifugal Compressors and Blowers.—De Laval Steam Turbine Co., Trenton, N. J. Catalog F, 48 pages, includes turbine-driven blast furnace blowers rated at 60,000 cu. ft. per min., against 30 lb. maximum pressure at 2800 r.p.m. Both single stage and multistage blowers and boosters for use in water gas plants and in connection with coal gas retorts and coke ovens are shown, as well as large multistage compressors for the high pressure called for in the gas industry. Other applications include converters, cupolas, pneumatic handling of materials and supercharging Diesel engines. The catalog includes data relating to the mechanics and thermodynamics of the compression of gases and the physical properties of industrial gases.

Electric Heat in Industry.—General Electric Co., Schenectady, N. Y. Bulletin 261-A of 48 pages illustrates and describes the application of electric heat to groups of basic operations commonly found in industrial plants. About a dozen pages are devoted to the metal industry and many other industries are covered. The industrial advantages of electric heat are stressed in the introduction.

Chain Grate Stoker.—Combustion Engineering Corporation, New York. Catalog of 27 pages illustrating and describing the Green natural-draft chain grate stoker. It is installed under boilers totaling over 1,200,000 rated hp. and can burn screenings from noncoking or moderately coking bituminous coals, high-ash coals and many lignites.

Bearing Metals.—Phosphor-Bronze Smelting Co., Philadelphia. Card 9 x 11 in., with table of sizes and approximate weights of Elephant brand phosphor bronze "S" metal bushings carried in stock. Cored bushings are in 49 sizes, from 1 to 10 in. outside diameter, the 1 to 4-in. sizes being in steps of ⅛ in. and the 4 to 10-in. sizes in steps of ¼ in. Outside diameter and sizes of cores are in black and the approximate weights of 12-in. lengths are in red; wall thickness is indicated at the bottom of each column. Weights of solid metal, stocked in 25 sizes, from 1 to 4 in. diameter, are shown at the extreme right of the chart, the arrangement of which is such that the data for each size of bushing may be read at a glance.

Industrial Lubrication.—Alemite Corporation, 2650 North Crawford Avenue, Chicago. Bulletin of eight pages, illustrating and describing the Alemite lubricating system, designed for reducing production costs.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

FREEDOM of the seas for food ships is proposed by President Hoover, but Europeans believe this would prevent an economic blockade of a belligerent nation, regarded the most effective weapon of the League of Nations. The President would prevent war by prompt adjustment of differences and increasing the sense of national security, rather than by enforcing peace . . . Guatemala and Honduras accept invitation to meet in Washington and discuss their boundary dispute.

* * * * *

MACDONALD is assured of whole-hearted support by all parties in the House of Commons for his plans for the naval conference. Work on Singapore naval base, being developed for battleships, is suspended . . . Release of funds from stock exchange eases interest rates in foreign as well as American financial centers to the benefit of trade. Further stimulation of employment in Great Britain is to come from an extensive program of utility improvements, highway construction and railway electrification . . . Canada will buy 600,000 tons of British hard coal this winter.

* * * * *

INDUSTRIES and regions connected with automobile and residential construction reflect the weakness in those lines. Thus, trade in the States bordering on the Great Lakes and the lumbering industry is depressed . . . Retail trade in other parts of the country is affected by continued mild weather . . . Other basic industries continue at a high level, with no marked reductions, other than seasonal.

* * * * *

FACTORY employment, wages and farm income remain at high figures; car loadings and retail sales also reflect a large volume of distribution in general trade, in the opinion of the Federal Reserve Board.

* * * * *

STOCK, grain and cotton exchanges declined severely but later recoverd all or nearly all of their losses . . . Commodities generally continue a slow but steady decline in price—good for consumers, but not so good for the producers.

* * * * *

TAX reduction (1 per cent on normal incomes of individuals and corporations) is promised by President Hoover, Secretary Mellon, and party leaders in Congress.

* * * * *

TEXTILE and cotton yarn production will be curtailed sharply by agreement among Southern mills, in order to match production to orders. About two weeks' supply is now on inventory . . . New England cotton industry is operating at about 80 per cent of one shift.

* * * * *

EXPORTS and imports during October were at highest totals for several months. Manufactured goods comprised half the exports; chemicals and machinery were prominent factors. Auto-trucks, exported to South America, constituted a bright spot in the automotive industry . . . Europe has taken considerably less copper this year than expectations.

* * * * *

BANK for International Settlements will be located in Basle, Switzerland. Its limited powers will not compete with various central banks, and it assumes no responsibility for settling the reparations question . . . Belgian representatives protested its location . . . Ambassador Schurman is negotiating a plan for direct payments, Germany to the United States, independent of the Young plan.

* * * * *

SOVIET budget, equivalent to $5,700,000,000, is nearly half again as large as last year, large increases being assigned to education, agriculture and electrification. Financing state industries will require 13 per cent of the total, but about one fifth this sum is expected to return to the treasury as profits . . . Efforts to establish collective and mechanized farms for intensive grain production have met much resistance from well-to-do farmers, and numbers of them have been executed or exiled . . . Eighty per cent of the grain crop has been taken by the State at a fixed price . . . House of Commons has approved resumption of diplomatic relations between England and Russia . . . MacDonald Engineering Co., Chicago, received a $110,000,000 contract to build cement plants, grain elevators and flour mills in Russia . . . United States Shipping Board has sold 25 cargo vessels, laid up seven years, to the Soviet Union.

* * * * *

RAILROAD construction valued at $200,000,000, comprising passenger stations, freight terminals and yards, is being undertaken in Philadelphia by the Pennsylvania and Baltimore & Ohio railroads . . . The New York Central Railroad proposes to increase its capital stock from $500,000,000 to $700,000,000 — its valuation is now over one billion. It has also asked the Interstate Commerce Commission to authorize a new main line skirting Syracuse, New York, where its present tracks occupy a down-town street . . . Transcontinental lines oppose Wyoming-Montana Railroad's plan to build and link up a system in the Rock Mountain States extending from Canada to Mexico . . . American Locomotive Co. has bought McIntosh & Seymour Corporation of Auburn, N. Y., manufacturer of the Diesel engines used for oil-electric locomotives.

* * * * *

TELEPHONE rates in New York will be increased $3 to $5 per year, according to award of Statutory Court in a 9-year old rate case. Company has a right to a 7-per cent return on reproduction value of plant, less depreciation.